ELECTRICAL REVIEW

and WESTERN ELECTRICIAN with which is consolidated ELECTROCRAFT

Vol. 69. CHICAGO, SATURDAY, NOVEMBER 25, 1916 No. 22.

EDITORIALS

ELECTRIFICATION PROBABLE IN CHICAGO.

Reports current in Chicago last week that Eastern stockholders of the Illinois Central Railroad were ready to provide the necessary capital for the electrification of that railroad's terminal and suburban lines in Chicago, has again stimulated interest in this matter and further resulted in renewed demands on the part of the newspapers and City Council that immediate action be taken. It is, of course, unwise to force action on a matter of such grave importance and involving such large sums of money; and the unthinking public, in its clamor for improved service, seldom realizes that in the final analysis the public always pays. However, throughout the entire period of negotiations between city and railroad officials, extending over a number of years, there has been obvious a clearly defined determination on the part of Illinois Central officials to ignore public demands and complacently await the time when electrification could be undertaken as a natural operation of growth. Ordinances and public demonstrations against the smoke nuisance, etc., have been of little or no avail.

What is needed are fewer mandatory ordinances and greater co-operation between railroad and city officials. Compromises must be made by both sides. The Illinois Central realizes that electrification is feasible, that it reduces operating difficulties and expense and that it is inevitable. The first cost is usually the determining factor. It is in the latter connection that the city must be willing to modify its demands. It should be remembered, however, that electrification of suburban lines has in every instance resulted in lower operating costs and increased volume of business. Also, in Chicago, it is claimed by authorities on the subject, that by electrifying its lines the Illinois Central could depress its tracks and thus make available a tremendous amount of rentable property that would undoubtedly pay handsomely on the investment.

Other railroads have worked out the problems of electrification and in most cases the question of power supply was of paramount importance and called for great expenditures and much engineering ability. In Chicago this question becomes incidental. The Commonwealth Edison Company, reflecting the keen foresight and rare ability of President Samuel Insull, has anticipated the electrification demands, not only of the Illinois Central, but of all railroads, and energy would be available long before the railroads could complete the other necessary changes. Supply of electrical energy from such a source would involve no increase in operating expenses, but would relieve the railroad from a large and unnecessary burden of investment.

CHRISTMAS TRADE.

While the Christmas season has always been looked upon as one of special importance to the retail trade in almost all lines, it is only of recent years that it has been attracting equal importance in the electrical trade. Of course, the use of electric lamps for decorative purposes has long been a feature of Christmas celebrations, but the suitability of electrical appliances for Christmas gifts has received only gradual recognition from the general public. Nevertheless it is going forward with increasing momentum along with the popularization of electric service in general and the multiplication of electrical devices for providing comfort and convenience in the home as well as in the factory and office. As a result, electrical dealers are giving more and more attention to the Christmas season in choosing their stock, arranging their displays and in planning their advertising. Each year the Christmas sales represent a larger item in the total volume of business and the dealer who realizes the possibilities in this line and utilizes them to the greatest advantage will add greatly to his success.

Christmas gifts among the wealthy have little significance beyond the indication of a remembering of friends at the holiday season. Among the middle classes, however, Christmas gifts are frequently chosen with the idea of providing for the recipient some comfort or luxury, which will be greatly appreciated, but is not among the class of necessities which the recipient would provide otherwise for himself. Many electrical devices represent possible gifts coming in this class. A large number of them are not yet recognized as necessities in the home and yet they represent a service which is very real in providing comfort or perhaps in relieving the housewife of some of the customary drudgery. This is one reason why they are becoming widely recognized as very suitable gifts for the Christmas season.

Great credit is due to the Society for Electrical Development for the efforts it has made and the services it has rendered in extending the popularity of electrical devices. Its planning of Electrical Prosperity Week last year resulted in a great impetus to the electrical trade, and a similar inauguration of America's Electrical Week for the first week in December of this year represents another effort which opens to the electrical dealer great possibilities in extending his trade and especially in relating it to the Christmas gift habit. Local dealers should lose no opportunity of tying the national campaign, including the large volume of national advertising,

with local features which will serve to focus local attention upon the suitability of electrical devices for Christmas gifts.

In carrying out this idea it is important that the local electrical merchant should have a suitable stock ready early and that he should take proper measures to bring it to the attention of the public. This can be done by having some kind of a feature opening for December 2, the first day of America's Electrical Week; by carrying out the carnival spirit in the decorations of his store at that time; by bringing in the Christmas spirit in these decorations and in the other activities of the store; by using special window displays; by having special demonstrations of electrical appliances at this time; and by following other activities which have been suggested in the literature so freely sent out by the Society for Electrical Development.

RUMFORD ON BRIGHTNESS.

To secure a desired lighting effect through the use of an artificial illuminant, it is not only necessary to provide the requisite amount of luminous flux, but it is also necessary to consider the surface from which the light is emitted. The position and the extent of this surface will determine the direction and diffusion of the light, the sharpness and intensity of shadows and the brightness of the luminous surface itself. These are all important conditions in securing desired lighting effects.

The immediate source of light may be either a primary or a secondary source. By a primary source is meant one at which the light is generated. By a secondary source is meant one which receives light from a primary source and modifies it by changing the direction or intensity of the light. Reflecting and diffusing media constitute secondary sources. Their importance in securing good effects in lighting installations has long been recognized, but is being more and more appreciated from year to year. This is especially true with respect to the use of diffusing glassware and the avoidance of sources of high intrinsic brilliancy.

That appreciation of the latter item is not a modern development was brought out at the October meeting of the Philadelphia Section of the Illuminating Engineering Society, where Dr. Enoch Karrer referred to a book by Count Rumford which was published in 1811. Count Rumford, or Benjamin Thomson, was born in the New England town of Rumford, but spent much of his life in England, where he conducted many investigations in the domain of heat and light, which have made his name well known to scientific investigators. Among other things he devised the photometer which is commonly known by his name. The following passage regarding the use of a diffusing shade is quoted from this book of Count Rumford:

"The intensity of light at the surface of a globular screen of ground glass four inches in diameter is four times greater than it should be if the diameter of the globe were eight inches. Now, as the quantity of light emitted will be the same in both cases, surrounding bodies will be illuminated as much in one case as in the other; but the illumination will be most mild, equal, and agreeable when the larger globe is used; and the eyes will be in much less danger of being fatigued and injured."

Intrinsic brightness of sources has recently received much attention on account of the fact that modern sources of artificial light bring new conditions in this respect. The electric lamp and the Welsbach mantle present extremes of brightness unknown among the artificial illuminants of a century ago, when the flame of burning fuel represented the only practical illuminant. The electric arc lamp and the gas-filled tungsten incandescent lamp are notable in this regard, and the latter more especially since it is better suited to indoor illumination. Yet in the days long antedating the application of electric lamps we find this genius recognizing the importance of brightness.

Count Rumford has perhaps not received as much recognition as one of the pioneers in the science and art of illumination as he is justly entitled to, and it would, perhaps, be fitting when need arises for naming another unit of measurement to be used by illuminating engineers to apply his name to such unit. This seems to be the favorite method of showing such appreciation in electrical and illuminating engineering and this pioneer seems to be one of those who might well be so honored.

INSTRUMENT ACCURACY.

One of the papers at the annual convention of the Southeastern Section, National Electric Light Association, which carries an important message to every central-station operator, was by Mr. F. M. Farmer, of the Electrical Testing Laboratories, and was entitled "The Maintenance of Central-Station Electrical Instruments." Mr. Farmer is in a position to know whereof he speaks, and his statement as to the inaccuracy of instruments found in practice is based upon the results of personal observations.

The importance of accuracy in switchboard instruments is not yet realized and yet it is one of the elements in the successful operation of a central-station system. If the switchboard voltmeter is not correct, for instance, it means that the nominal voltage of the supply circuits is not being realized in practice and this is a feature which militates against the best results in operation. If voltage is permitted to fall below the proper value, it means that less energy will be consumed than at normal voltage and consequently less revenue will be received by the operating company, wherever bills are based upon metered energy consumption. In addition to this the service is less satisfactory than it should be, since certain types of motors will operate below normal speed and incandescent lamps will give less than their rated output of

light. On the other hand, high voltage reduces the life of incandescent lamps and caused a departure from the nominal speed of motors in the other direction. The speed of motors is an important item in many classes of manufacture and deviations from the normal speed may affect not only the quantity of output, but also its quality, and result in a larger proportion of inferior grades or in annoying interruptions to the continuity of the work. The latter is particularly true of the textile industries.

Where synchronous motors are used the speed will depend upon the frequency of the alternating current, and here again it is evident that unless the frequency meter is properly calibrated, the operator will be unable to properly adjust the speed of his generator. Similar comments might be applied to the ammeters connected in series lighting circuits, and to the other instruments upon the switchboard. Instrument transformers represent possible errors unless accurate determinations of ratio and angle are made. Unless the totalizing watt-hour meter is properly adjusted the station output will not be correctly known. The attention of managers is so often directed to the importance of accuracy in the watt-hour meters upon the premises of customers that it is now general practice to have a meter department which looks closely after this end of the business and thus insures that the station revenue will approach as nearly as possible to correspondence with the actual consumption of energy; but the same care and interest has not been generally extended to switchboard instruments installed in generating stations and substations, and it would be well if more general attention were given to the proper maintenance of such instruments. In states where utility commissions have supervision of the operating companies, inspectors are giving attention to the proper maintenance of the nominal operating values and unless companies have their own instruments properly adjusted they are likely to be involved in considerable trouble and dispute over matters of this nature. It is not only more satisfactory and cheaper in the long run to be correct at the start in matters of this kind, but it gives the company a reputation with both customers and utility commissions which is of great value when controversies arise upon other subjects. The company which is known to give good service and operate its system properly and satisfactorily is likely to have doubts upon other matters resolved in its favor when the occasion arises.

The general practice among the larger utility companies is probably better with respect to the maintenance of instrument accuracy than is the case among the smaller companies and it is the latter that should direct their attention particularly to this matter and see if their present practice could not be improved in this respect. Systematic methods for periodical checking up of switchboard instruments will be found to be well worth while and will bring to light errors which if allowed to run along indefinitely might have a serious effect upon station operation.

PUMPING FOR MUNICIPAL WATER SUPPLY.

The choice of pumping equipment for the water supply of a town or city will of course depend upon local conditions, but there is seldom a case where electric power is available that an advantage will not be gained by applying the electric motor to whatever form of pumping equipment seems to best suit the local requirements. Plunger pumps can be driven to advantage by electric motors, but the special advantages of the latter are more evident when a centrifugal pump can be applied. In addition to other advantages the centrifugal pump makes it possible to connect a pump directly to the water mains without making use of a reservoir or a standpipe. Such a method of operation makes it essential, however, to have the pump continuously in operation, while in many instances an advantage can be secured by operating the pump at off-peak hours and having sufficient reserve capacity in the reservoir to carry the supply through the idle periods.

When a reservoir is not used, it is essential to have duplicate equipment, either portion of which is capable of meeting the usual demand for both domestic and fire service. This is necessary to meet the requirements of the fire-insurance interests if a town is to secure the lowest rates for insurance. It is also necessary to have two independent sources of electric current supply. It is also necessary at times to have equipment of greater capacity than is ordinarily needed, to meet the exigency of fire fighting. This sometimes means the operation of equipment at small load and consequently at low efficiency unless use is made of several small units. Triplex plunger pumps give good efficiency when motor-driven under domestic service pressure and will deliver the same volume at double the pressure when required. Fifty pounds per square inch is usually considered sufficient pressure for normal domestic consumption, which will prevail for a very large percentage of the time, but for fire fighting it is frequently desired that the pressure be raised to double this value or even higher.

Elsewhere in this issue is an article pointing out the advantages of electrical drive for pumping plants, especially in connection with central-station service. The central station can offer low rates for service of this kind because continuous operation represents a load of the highest load-factor, and on the other hand if it is not necessary to have continuous operation, arrangements may be made to have this load thrown off during the station peak. The load is then an even more desirable one than if it had a load-factor of 100 per cent. Of course, in this case it is necessary to have storage facilities and also a larger capacity of apparatus than if operation were continuous. It is not so necessary, however, to have duplicate equipment. In considering the utilization of electric power for this service it is well to bear in mind that the operating expenses for maintenance and labor are less than where the drive is supplied by steam or by some other form of prime mover.

Happenings in the Industry

Merchandising Appliances and Sale of Power to Hotels, Stores and Office Buildings Discussed at Ohio New-Business Meeting—Hydroelectric Development Important Topic at Southeastern Section Convention—President Wilson Will Officiate at Flood-Lighting Ceremonies on December 2—Auspicious Opening of Ohio Valley Electrical Exposition at Cincinnati

MERCHANDISING APPLIANCES AND SALE OF POWER TO HOTELS AND STORES DISCUSSED.

Ohio New-Business Men Hold Profitable Meeting in Cincinnati.

The meeting of the New Business Co-Operation Committee of the Ohio Electric Light Association held on November 21 at the Hotel Gibson, in Cincinnati, was one of the most interesting and successful held by the Committee in some time, due to a considerable extent to the desire of the members outside of Cincinnati to attend the Ohio Valley Electrical Exposition in progress in that city during the week. This lent special point to the gathering, aside from the fact that meetings held in Cincinnati are always well attended, on account of the prestige of the Union Gas & Electric Company and the popularity of its officials as members of the Association. Between fifty and sixty members attended the committee meeting, over which J. E. North, of Springfield, presided as chairman.

The session was devoted strictly to business, beginning promptly at 10 o'clock with the reading of a paper by C. E. Yacoll, of the Mahoning-Shenango Railway & Light Company, Youngstown, O., entitled, "Promotion of Electrical Merchandise Sales During the Holiday Season."

Mr. Yacoll pointed out that the practical value of the numerous articles in the electrical appliance line fits them extremely well for pushing as holiday gifts, and emphasized the fact that this year, especially, in view of the general prosperity of the country and the large expenditures that will undoubtedly be made, extra selling efforts will be well repaid. He cited the fact that in Youngstown, especially, with a population of 115,000, there are 67,000 savings accounts averaging $177. All that is needed in order to secure the sale of more electrical appliances than ever this season, he pointed out, is to urge to the public the gospel of practical gifts, through advertising and general publicity.

The discussion which followed the reading of Mr. Yacoll's paper, was based on practical experiences of members and consumed over an hour. It brought out the views of many of the members, salesmen and appliance-department managers, who told what they had been able to do in the sale of electrical goods in the holiday season and at other times, by the use of intelligent and aggressive methods.

R. E. Flower, manager of the Electric Shop of the Union Gas & Electric Company, outlined his method of getting business as one of interesting the public in his goods, by any or all of several methods, including newspaper and street-car advertising, and window-displays. The last-named, he emphasized, is one of the best and one of the most neglected publicity mediums. Windows should be used regularly and intelligently, with changes at least once a week. The use of a leader to pull people into the shop, such as a portable lamp at $4.50, cited by Mr. Flower, is an excellent device, leading to the purchase of other goods. A lot of 400 such lamps was sold at the Electric Shop last Christmas, he said, and with a similar lamp now selling as a leader at $4.95 there were 46 sold on a recent Saturday. Demonstrations in the windows always attract favorable attention, while moving electrical toys also pull well. Additional discussion on this paper will be given in a later issue.

The second paper on the program, by W. H. Whittington, of the Springfield Light, Heat & Power Company, was on the subject of "Electric and Steam Service in Hotels, Department Stores and Office Buildings." For the purpose of facilitating discussion, Chairman North separated the paper into its two natural divisions, having Mr. Whittington read first that part of his address dealing with electric service to the three classes of consumers named, and then, after discussion of the subject, the latter part, dealing with steam service to the same classes.

Mr. Whittington outlined the rich field offered by the three classes of consumers named, by reason of their location, as a rule, in the business district, readily accessible to the lines of the central station and using energy in large quantities, and then pointed out that the great obstacle to securing the business, as a rule, lies in the fact that many hotels, department stores and office buildings have installed their own plants. It was emphasized that the building with its own plant is not only not a customer as long as the plant is operated, but is in a sense a competitor of the central station, selling current to its tenants. He presented data from companies operating in some of the principal cities of Ohio, Illinois, Indiana and Michigan relative to the handling of this type of business.

The discussion on this subject, which was started by Mr. Wadsworth, of the Union Gas & Electric Company, Cincinnati, brought out the fact that in some cities there are comparatively few isolated plants competing with the central station, whereas in others, notably Cincinnati, there are numerous plants of that nature. Mr. Wadsworth was able to point to some signal triumphs in sales to concerns maintaining isolated plants, however, notably in the case of the Union Central Life Insurance Company's splendid new building. This building, the highest in the country outside of New York, was completed only two years ago, and was equipped with a highly efficient steam and generating plant of its own; but the Union Gas & Electric Company was able to prove that its service was the more economical, and secured the business.

Summer business from concerns maintaining their own plants, but shutting them down during the warm weather, when steam is not required for heating, is available, Mr. Wadsworth pointed out, as a means of taking care of the excess capacity of the central station during the warm months and can be secured by making special rates.

The treatment of the subject of steam service to the types of consumers mentioned, in the latter part of Mr. Whittington's paper, was unusually interesting, especially as very few of the members knew anything about the matter from actual experience, in fact, it seems that the Springfield Light, Heat & Power Company is the only one in the State serving any large number of customers with steam, although there are several, including the companies at Columbus and Youngstown, with a few large customers near their plants.

President W. W. Freeman, of the Union Gas & Electric Company, welcomed the members to Cincinnati and to the Ohio Valley Electrical Exposition, at the luncheon which followed the adjournment of the session. He said that he realized fully the importance of the new-business field, inasmuch as new business is essential to the growth of any electric central-station company.

HYDROELECTRIC DEVELOPMENT DISCUSSED BY SOUTHEASTERN SECTION, N. E. L. A.

Papers on Water Powers of South and Municipal Ownership Feature Tampa Convention.

The fourth annual convention of the Southeastern Section of the National Electric Light Association, which was held at Tampa, Fla., November 15 to 17, was characterized by the diversity of topics that came up for discussion and by the attendance of a large number of speakers very prominent in the electrical industry. Among the notables who spoke were T. C. Martin, national secretary; Arthur Williams, of the New York Edison Company, and John H. Finney, manager of the Aluminum Company of America.

The convention was called to order Wednesday morning by President Woodsome, of Tampa. He introduced Mayor McKay, who delivered an address of welcome, Judge J. M. Cheney of the Orlando (Fla.) Water & Light Company responding. J. A. Griffin, of the Exchange National Bank of Tampa, followed with an address on the duty a public service corporation owes to the public.

Address by T. C. Martin.

T. C. Martin, secretary of the National Electric Light Association, delivered an address dealing with the history of the electrical industry from its beginning up to the present time, and illustrated the wonderful growth of the Association. He told how they had started with a few members and now numbered thousands. He stated that most of the work from now on would be done by the geographic sections. Mr. Martin was followed by President Woodsome, who embodied in his address some very constructive remarks pertaining to the electrical industry in the South.

Conservation of Human Energy.

John H. Finney, manager of the Aluminum Company of America, was the first speaker on the afternoon program, his subject being "The Conservation and Direction of Human Energy." He reviewed the water-power situation, laying stress on the waste involved in its non-use and pointing out the meaning of wide use of water-generated electrical energy as a conserver of human energy. He said the South was blessed in material resources and that intelligent direction is necessary to grasp the opportunities that exist. In discussing Mr. Finney's address, W. E. Mitchell, of the Alabama Power Company, Birmingham, stated that Alabama has available 1,000,000 horsepower in water power, with only 100,000 horsepower developed. He also stated that recently a very large manufacturer had decided not to locate his establishment in the South because the opportunities for securing hydroelectric power did not seem great enough. G. K. Hutchins, of the Columbia (Ga.) Power Company, said the cost of hydroelectric development was from $150 to $250 per horsepower.

Municipal Ownership.

Arthur Williams, commercial manager of the New York Edison Company, spoke on "Municipal Ownership and Some Attendant Questions," and brought out some of the most important features in connection with this subject, abstracts of which will be published in a later issue. The discussion on municipal ownership was participated in by W. R. Collier, of the Georgia Railway & Power Company, Atlanta, and by C. B. Flanigen, of the Athens (Ga.) Electric Company, who pointed out that central stations have two important adversaries: isolated plants and municipalities which threaten to buy existing plants or install new ones. A policy of education was declared necessary to overcome adverse opinion.

Accounting a Part of Management.

The Thursday morning session was opened by a paper on "Accounting an Essential of Management," presented by F. G. Whitney, auditor of the Southern Utilities Company, Jacksonville, Fla. The paper emphasized the prime importance of accounting in the conduct of modern business, and was a plea to engineers for recognition of the accountant's calling as a serious profession attempting to obtain good results in the present type of management of public utility companies. The paper was discussed by E. J. Seaborn, Tampa (Fla.) Electric Company; J. M. Cheney, Orlando (Fla.) Water & Light Company; H. M. Kohn, Birmingham (Ala.) Railway, Light & Power Company, and G. H. Wygant, Tampa (Fla.) Electric Company. The conclusion reached in the discussion was that the field is open to accountants as well as engineers, but to avail themselves of the opportunity the former should emulate the engineers and grasp the essentials of the business.

Maintenance of Electrical Instruments.

F. M. Farmer, chief engineer of the Electrical Testing Laboratories, New York, N. Y., presented a paper on the "Maintenance of Central Station Electrical Instruments," in which the importance of accuracy in measurements, the cases of inaccuracy in instruments, necessity of effective maintenance and examples of errors in small central stations were illustrated. W. E. Mitchell, of Birmingham, Ala., and P. A. Tillery, of Raleigh, N. C., discussed the paper and stated that in alternating-current plants the frequencymeter is as important as the voltmeter, because low frequency means low speed and the latter means less power, which results in less revenue. Speed regulation is very necessary in cotton mills and necessitates close checking. Loss of revenue is occasioned by errors on instrument transformers, which need checking frequently.

Advertising Electricity.

The next paper was read by J. C. McQuiston, advertising manager, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., on "Advertising Electricity; Its Service and Application." The paper gave numerous suggestions for correct methods of advertising electrical energy and devices, and also gave considerable information on relative values of different mediums of advertising, and the results that could be obtained by experience and good judgment to get results out of an advertising appropriation. The growing realization among central-station men of the importance of advertising and selling was commented upon. In the discussion, Leake Carraway, Charlotte, N. C.; P. R. Chambers, Bradentown, Fla., and H. M. Kohn, Birmingham, Ala., expressed the opinion that all central-station advertising should carry with it some form of educational value, and that it was best to advertise a few articles at a time.

Steam-Turbine Developments.

M. B. Carroll, of the General Electric Company, Lynn, Mass., opened the afternoon session with a paper on "Recent Developments in Steam Turbines," which considered a number of turbine installations possessing novel features either in construction or size or the method of application to the particular problem to be solved. Developments and improvements in construction appealing particularly to those interested in power-plant operation were outlined. Following the reading of the paper the author gave an illustrated lecture on the construction of turbines, in which a motion picture showed the processes of manufacture and assembly. The paper was discussed by F. G. Godfroy, Florence, S. C., who gave some figures showing the relative efficiency of steam turbines and old-type engine generators.

Street Lamps and Window Lighting.

This paper was followed by one on "The Future Street Lamp," by W. P. Hurley, of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. The history of the electric lamp was first outlined and the trend of future development given. The discussion, which was

participated in by W. M. Skiff, National Lamp Works of the General Electric Company, and J. D. Bourne, Atlanta, Ga., brought out several interesting points. Central stations were urged to adopt one of three standard voltages. It was stated that the tendency in white-way lighting was to adopt single-unit standards in preference to cluster lighting.

A paper on "General Store and Window Lighting" was presented by F. E. Lauderbach and Norman Hickox, of the National X-Ray Reflector Company, Chicago, Ill., in which recent tests and late development of window reflectors were outlined. The paper was discussed by H. L. Parker, St. Petersburg, Fla., and H. M. Kohn, Birmingham, Ala., who pointed out that it was advantageous to have wiring in windows done while the building was being built, otherwise the time and energy expended in securing this business on a proper basis is costly. The paper was followed by a demonstration of the use of reflectors to solve different lighting problems.

Electrical Heating Devices.

Friday morning's session was opened with a paper on "The Heating Device Load," presented by Frank Hammond, general agent of the Birmingham Railway, Light & Power Company, who gave points of general information on the use and development of electrical heating appliances. The discussion was participated in by Messrs. Wygant, Collier, Parker, Kohn, Godfroy, Tillery, Peters and Marriner. The consensus of opinion was that it was necessary to have special heating rates in order to develop a large load of this kind. An opinion was expressed that the electric range was here to stay and would take its place among other electrical appliances when sales were pushed vigorously enough by central stations. Most members present expressed themselves as favoring special campaigns for the selling of heating devices.

E. P. Peck, superintendent of the department of tests and repairs, Georgia Railway & Power Company, Atlanta, Ga., presented some notes on "Grounding of Secondaries" and "Lightning Arresters," which were discussed by H. A. Orr, Anderson, S. C., and W. R. Collier, Atlanta, Ga.

The report of the Public Policy Committee was presented by Secretary T. W. Peters, of Columbus, Ga. The several points brought out included: The tendency in rate making should be toward uniformity; a resume of a number of so-called successful municipal plants was made; studies were presented of proposed legislation in the South regarding competitive plants, and of other laws affecting the operation of central stations.

Hydroelectric Committee Recommends Legislation.

A closer co-operation of different companies was reported in the findings of the Hydroelectric Committee, which had prepared for adoption by the Association a resolution dealing with its concern over the present stagnation in hydroelectric development in the South. It was declared that the water powers were needed for industrial advancement and that the present attitude of Congress in regard to development is unfair to the communities requiring power. The resolution was passed and will be submitted to the national body for approval, in which event members of the Section will make individual appeals to members of Congress to remedy the situation.

Election of Officers.

Following the report of this committee an executive session was held. The election of officers for the ensuing year resulted as follows:

President, W. E. Mitchell, Alabama Power Company, Birmingham.

First vice-president, H. A. Orr, Southern Public Utilities Company, Anderson, S. C.

Second vice-president, C. I. Day, Southern Utilities Company, Jacksonville, Fla.

PRESIDENT WILL OFFICIATE AT FLOOD-LIGHTING CEREMONIES.

Elaborate Program Completed for Flood-Lighting of Statue of Liberty On December 2.

America's Electrical Week will be inaugurated by the first permanent flood lighting of the Statue of Liberty on the evening of December 2. President Wilson and a distinguished gathering of diplomats and industrial leaders will officiate at a program of ceremonies starting in lower New York harbor and concluding at a magnificent banquet to the nation's executive in the Waldorf-Astoria Hotel.

A committee on arrangements will have charge of an electric-vehicle parade starting from the Battery and passing up Broadway to Lafayette Street over Fifth Avenue to the Waldorf-Astoria Hotel.

The reception committee will meet President Wilson just below Bedloe's Island. The President with Mrs. Wilson and immediate friends will be in the *Mayflower* at anchor below the island. After the committee boards the *Mayflower*, the vessel will steam abreast of the Statue of Liberty, when a presidential salute will be fired from the North Atlantic Fleet strung up the Hudson River.

The first salute will be a signal for the turning of the permanent illumination which will take place about 6:30 o'clock.

Another committee has under way a program for illuminating and decorating the thoroughfares of lower Manhattan, through which the procession will pass. It is expected that the flood of special lighting along these passageways with the spectacle of the Sperry searchlight and the searchlights from the battleships in the river will present an illumination spectacle unparalleled in the annals of lighting in America.

The official ceremony of rededicating the statue will take place at the Waldorf-Astoria Hotel. Ambassador Jusserand will present a special message from the president of France. Ex-Senator Chauncey M. Depew, who delivered the main oration at the dedication of the statue 30 years ago, will deliver an oration to which it is expected that the president will reply briefly.

Complete details of the program are in the hands of committees who have had to abandon several elaborate ideas because of the shortness of time. The General Electric engineers who are working with government officials in completing the equipment and installation have assured the New York *World*, sponsor of the movement, who raised money to flood-light Liberty, that all the apparatus will be in place and ready for a permanent lighting of the statue on the evening of December 2.

OHIO VALLEY ELECTRICAL EXPOSITION AT CINCINNATI.

Auspicious Opening of Show Which is to Usher in the Local America's Electrical Week Celebration.

The Ohio Valley Electrical Exposition, the natural successor of last year's highly successful electrical show in Cincinnati, was opened in the Queen City on the afternoon of Saturday, November 18, with every indication of eclipsing even the enormous attendance and popular appreciation of the 1915 event.

The exposition was formally opened on Saturday by prominent officials, state and local, and with a big attendance brought out by the half holiday and good weather. The extent to which manufacturers and others interested in the advancement of electricity are participating in the show may be gathered from the fact that there are over 200 exhibitors using space in the two great wings of Music Hall devoted to that purpose. This is considerably in excess of the number participating last year, and in itself

justifies the assertion that the 1916 show will set new records.

Ample publicity of an attractive sort, featuring electricity, helped the cause of the exposition in advance, and kept the public advised of the progress of the event during the week. Fountain Square served as the center of the public illumination on behalf of the exposition, with a big "motograph" sign, erected by the Federal Sign System, Electric, carrying a message relating to the attractions of the show, with frequent changes. In addition, the Square is brilliantly illuminated by five rows of eight candelabra each, suspended high above the level of the esplanade, and hung with streamers of various colors. It is possible that this illumination effect will be turned over to the city after the exposition is over, but this has not been decided upon definitely.

Aside from an extremely varied list of electrical attractions at the exposition, for the most part in the form of demonstrations of the infinite capacity of current in the performance of manifold tasks, the management of the affair has placed an attraction of high merit on the big stage of Music Hall. The stage has been converted into an indoor ice rink, the first seen in Cincinnati, and a troupe of a dozen performers entertains the public continually. An illuminating feature in the main lobby of the building is an effect called "The Hall of a Thousand Prisms," the operation of spot lights on artistically hung reflecting material producing a glittering mimic snow storm.

The exhibition space is a blaze of light and action, with the operation of the devices shown by various manufacturers and dealers offering fresh material for the interest of visitors at every point. It is worth noting that practically all of the exhibits were in place for the opening of the exposition, and there were no exceptions whatever by Monday, which was in effect the first day, as the show has run all during the current week, closing on the evening of Saturday, November 25. The possibility of including two Saturdays led to the opening of the show on the previous Saturday, however, and the size of the attendance on that day abundantly justified the move.

Public Service Exhibits.

Perhaps the most striking group of exhibits, and that of most real interest to the majority of the visitors, was that conducted by local public service corporations, for the purpose of showing how the service rendered by them to the public is taken care of. The details in handling telephone service, the mechanical "insides" of an electric street car, full sized, and the possibilities of electricity in domestic use, are all shown in such a manner that even without understanding fully the way the work is done, no one could fail to appreciate the magnitude of the service rendered, or its importance to the individual and the community; and this, obviously, is of the highest value, not only to the companies making the exhibits, but to other members of the industry.

When taken in connection with numerous other exhibits, however, all tending to show the wide practical, everyday field for the use of electricity, it can be understood that the exposition has a value as an eductional factor which cannot be estimated; and its management on a basis by which the public is more than willing to pay for the privilege of visiting the show, and learning the numerous ways in which the slogan "Do It Electrically," can be obeyed, is a real triumph of propaganda.

Electric Sign Advertising Cincinnati Electrical Exposition.

The Federal Sign System (Electric) installed the motograph sign shown herewith, which was placed at Fountain Square to advertise the electric show during the week of and the week previous to the Ohio Valley Electrical Exposition. The novel feature of this sign is the Motograph part which is the most recent development in electric sign construction. The display portion of the sign upon which the letters appear is studded thickly with sockets at regular intervals. Wires are carried from each socket to a terminal board on the controlling apparatus. By passing a perforated paper ribbon between the terminal board and a corresponding brush board which is also a portion of the controlling apparatus, lamps corresponding to the perforations in the ribbon are caused to light up on the face of the sign. The effect of the moving ribbon passing through the control apparatus is to cause the letters to appear at the right hand end of the display sign and to pass across its face and disappear at the left hand end. By this means a constantly changing reading is caused to pass across the face of the sign in letters of huge size. There are 1,500 lamps of the 8-candlepower size in this sign, making a total of 12,000 candlepower.

Electricity In Municipal Pumping Plants

Because of the Characteristics of the Load, City Water-Pumping Plants Can Economically Purchase All Power Required. This Is Borne Out By the Experience of Texas Communities, as Described Herewith

Industrial Power Series—Article No. 182

THE ordinary type of city water-pumping plant is a very desirable load for the central station inasmuch as it has a high load-factor and the peak of the load usually comes in the summer when the load on the central station is lightest. In some parts of the South where waterworks supply large quantities of water for seasonal industries, such as oil mills, cotton gins, etc., this is not always true. However, the statement holds generally.

A properly designed water-pumping plant operated by steam should have a very good operating load-factor and for this reason the operating costs are lower per unit of energy than for industries which operate only eight or ten hours per day. On this account it is sometimes difficult to interest the waterworks management in the substitution of electric drive for their present equipment. This is even more difficult when the waterworks is operated by the city, as ordinarily, municipal bodies are slow to move.

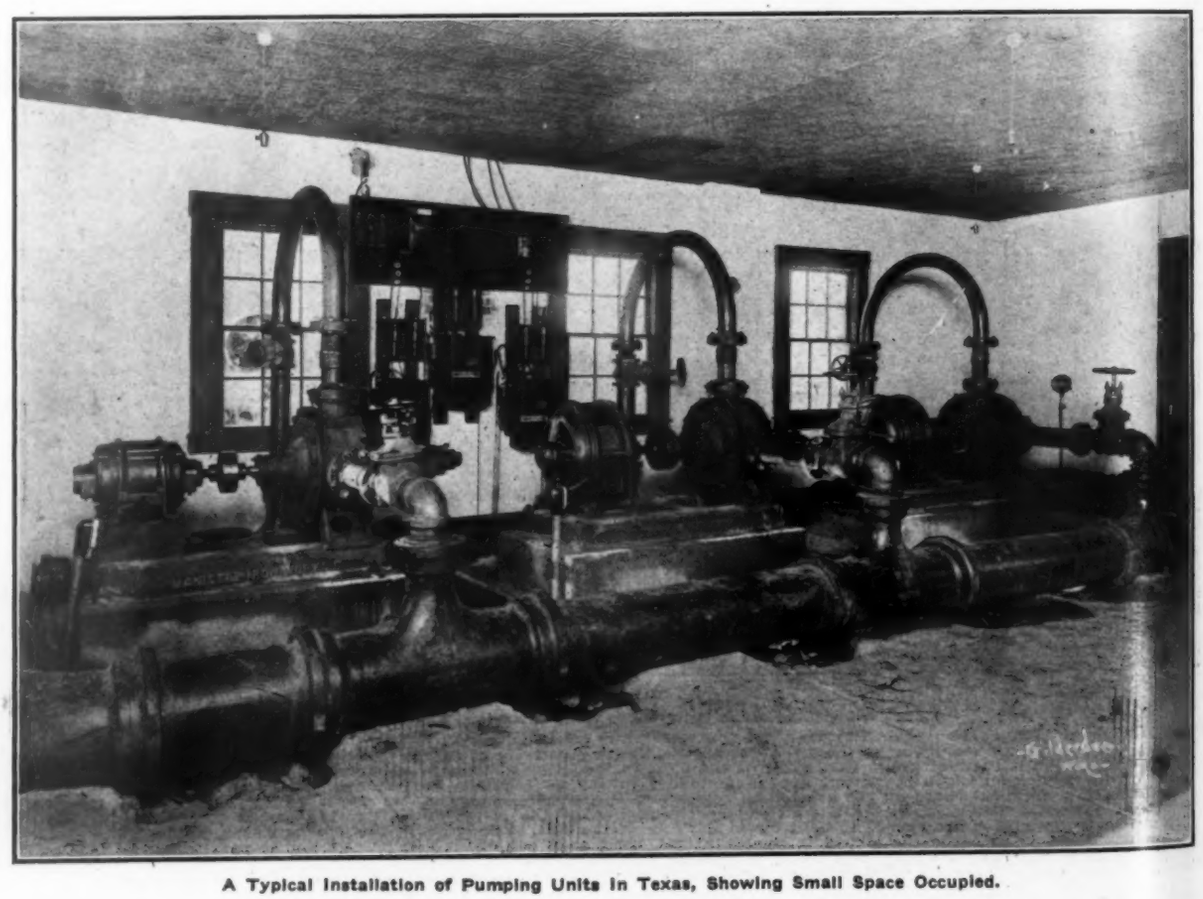
Due to the fact that one rarely finds two waterworks plants operating under the same conditions, each plant becomes a problem in itself and must be solved as such.

In approaching the waterworks problem the following points should be considered: (1) Type of equipment; (2) operating characteristics; (3) equipment maintenance; (4) labor.

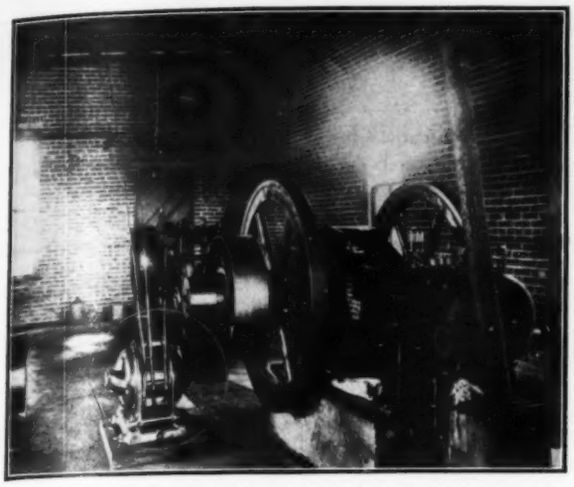
In the majority of cases it will be found the plants are operating duplex steam plunger pumps, of either the simple or compound type. The best of such have a large steam consumption per horsepower-hour and when they can be replaced by centrifugal pumps, direct-connected to electric motors, the problem becomes much simpler. High-efficiency centrifugal pumps can now be obtained which give almost perfect regulation. Some of the illustrations herewith show pumps which are connected directly to the distributing system. These are being operated without a standpipe and are giving universal satisfaction both from an economical and from an operating standpoint.

Where air compressors are being used to pump water from deep wells, it is advisable, if possible, to replace these with deep-well pumps driven by individual motors. In this way, even though a number of wells are scattered over the town, economy of operation can be obtained by pumping all the water into a central reservoir and thence into the standpipe or mains. A waterworks system which is operating a number of deep wells either from a central air compressor or by means of a number of deep-well pumps driven by separate power units, is usually easily converted to electric drive due to the convenience in operating a number of motors.

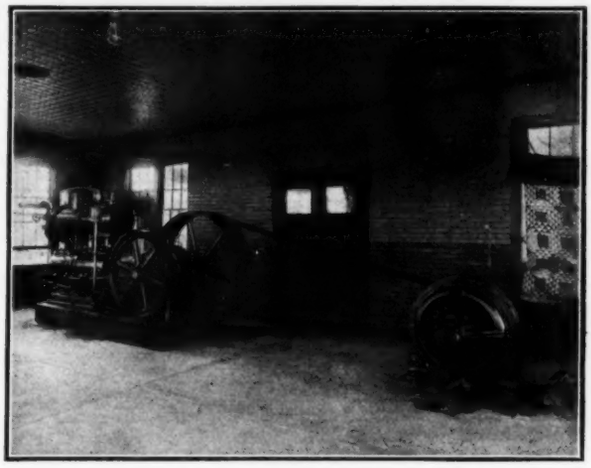
A careful study should be made, from a load-factor standpoint, of the equipment already installed and the information obtained used in arriving at a conclusion as to the



A Typical Installation of Pumping Units in Texas, Showing Small Space Occupied.



This 15-Horsepower Motor Replaced the 20-Horsepower Gasoline Engine.



Air-Compressor Driven by a 75-Horsepower Motor In Pumping Plant.

type of electrically operated equipment to install. In some cases it may be found advantageous to install electrical equipment which will operate 24 hours a day. In other cases it may be possible to install larger equipment and take advantage of operating this equipment "off peak" as compared to the central-station load. Such operation is ordinarily possible only where a large amount of storage is available.

Equipment of Pumping Plants.

The type of equipment and the operating characteristics of the plant are linked closely together. Some plants using standpipes operate their service equipment intermittently so as to keep the standpipe full enough to maintain the required pressure on the mains. Other plants pump directly into the mains and vary the speed of their steam pumps so as to maintain the required pressure.

Equipment maintenance plays an important part in the sale of an electric proposition. Maintenance on duplex steam pumps, steam-driven air compressors, internal-combustion engines, and auxiliary equipment in the average isolated waterworks runs into large figures and where a record of such maintenance is accurately kept, the salesman should be careful that he gets all these data before making his proposition. In some cases this item will be the deciding factor in closing the sale. The low maintenance charge on electric motors and the low maintenance on centrifugal pumps and belt-driven air compressors is a strong argument when compared with the maintenance charge on steam-driven equipment.

Economy of Labor in Electric Plants.

The labor item is also an important point which should be studied carefully. Automatically operated equipment is possible in quite a few plants. Such equipment will usually pay for its cost in a short time in reduced labor charges. The manager of a plant can seldom be convinced that he can do away with any of his labor by putting in electrical equipment, but after the equipment has been installed it is usually found that the labor cost can often be cut in half. The best argument to use in such cases is to cite actual examples of electrically operated plants which have reduced labor cost by using electricity.

In many cases, especially in sections where electric in-

Modern Automatic Electric Pumping Plant—Fire Pump On Left.

Data Sheet.

The term load-factor is used in these data in such a sense that a load-factor of 100 per cent represents the use for twenty-four hours every day of power corresponding to the rated capacity of the motors connected. An operating-time load-factor of 100 per cent represents the use of the rated capacity of the motors for the running hours per day specified for each installation.

Installation No. 1.—Waterworks pumping plant with a total capacity of 2100 gallons per minute capacity. Daily operation 24 hours. One man lives at the plant and looks after operation.

Total horsepower installed 225. Total number of motors 2. Average kilowatt-hours per month 60,464.

Kilowatt-hours consumption for one year:

Month.	Kilowatt-Hours.	Month.	Kilowatt-Hours.	Month.	Kilowatt-Hours.
January	56,874	May	54,300	September	69,000
February	52,900	June	54,900	October	70,600
March	54,400	July	62,100	November	62,200
April	58,900	August	73,900	December	55,500

Annual load-factor 49 per cent.

Motor Installation.

Following is a list of motors installed with their respective drives. Three phase, 60 cycle, 2200 volt, alternating current is used.

No.	Horse-power.	Speed R. P. M.	Application.
1	150	1200	Direct-connected to 1400 gallon-per-minute, 10-inch three-stage, vertical, centrifugal pump. Total head 290 feet.
1	75	1800	Direct-connected to 700-gallon-per-minute, five-inch three-stage, vertical, centrifugal pump. Total head 290 feet.

Installation No. 2.—Waterworks pumping plant having a total capacity of 1550 gallons per minute. Daily operation 24 hours. One man lives at the plant and looks after entire operation.

Total horsepower installed 185. Total number of motors installed 4. Average kilowatt-hours per month 28,148.

Kilowatt-hour consumption for one year:

Month.	Kilowatt-Hours.	Month.	Kilowatt-Hours.	Month.	Kilowatt-Hours.
January	22,100	May	27,700	September	32,190
February	22,400	June	30,700	October	31,190
March	29,000	July	35,300	November	29,120
April	22,400	August	33,980	December	21,700

Annual load-factor 28 per cent—fire pump excluded 39 per cent.

Motor Installation.

Following is a list of motors installed with their respective drives. Three phase, 60 cycle, 2200 volt, alternating current is used on all except the 10-horsepower motor.

No.	Horse-power.	Speed R. P M.	Application.
1	75	600	Belted to 14-by-12 duplex air compressor for blowing water.
2	50	1800	Direct-connected to two 500-gallon-per-minute centrifugal pumps, pumping against 231 feet total head.
1	10	1200	Direct-connected to 550-gallon-per-minute centrifugal pump, against 32 feet total head.

Installation No. 3.—Waterworks pumping plant having a capacity of 5250 gallons per minute. Daily operation 24 hours. One man lives at the plant and looks after its entire operation.

Total horsepower installed 265. Total number of motors 4. Average kilowatt-hours per month 33,200 (when operating all equipment).

Kilowatt-hour consumption for one year:

Month.	Kilowatt-Hours.	Month.	Kilowatt-Hours.	Month.	Kilowatt-Hours.
January	22,450	May	21,600	September	5,480
February	9,860	June	37,380	October	4,640
March	36,600	July	40,470	November	23,780
April	32,700	August	7,050	December	25,230

Monthly load-factor 23.0 per cent—excluding fire pump 54 per cent.

Data Sheet.—Continued.

Motor Installation.

No.	Horse-power.	Speed R. P. M.	Application.
1	150	1200	Direct-connected to two-stage, eight-inch 1500-gallon-per-minute centrifugal pump, against 230 feet total head. (Fire pump.)
1	75	1800	Direct-connected to two-stage, six-inch 750-gallon-per-minute capacity centrifugal pump, against 210 feet total head.
2	20	1800	Each direct-connected to single-stage, eight-inch, 1500-gallon-per-minute total capacity centrifugal pump, against 30 feet total head.

Installation No. 4.—Waterworks pumping plant having a total capacity of 1850 gallons per minute. Three stations. One station used only occasionally. One operated 14 hours per day. One operated 24 hours per day.

Total horsepower installed 225. Total number of motors 5. Average kilowatt-hours per month 50,586. Kilowatt-hour consumption for one year:

Month.	Kilowatt-Hours.	Month.	Kilowatt-Hours.	Month.	Kilowatt-Hours.
January	52,730	May	42,620	September	56,960
February	42,460	June	56,020	October	60,040
March	44,970	July	44,470	November	52,770
April	48,190	August	56,380	December	49,420

Annual load-factor 42 per cent.—excluding fire pump 54 per cent.

Motor Installation.

No.	Horse-power.	Speed R. P. M.	Application.
1	75	720	Belted to 14-by-9-by-12 Bury, two-stage air compressor for blowing deep wells.
2	50	1800	Each direct-connected to four-stage, five-inch, 550-gallon-per-minute capacity centrifugal pump, against 250 feet total head.
1	35	1800	Direct-connected to two-stage, five-inch 500-gallon-per-minute capacity centrifugal pump, against 170 feet total head.
1	15	1800	Direct-connected to two-stage, four-inch, 300-gallon-per-minute capacity centrifugal pump, against 120 feet total head.

Installation No. 5.—Waterworks pumping plant having a total capacity of 1400 gallons per minute. Seven stations and wells are operated.

Total horsepower installed 105. Average kilowatt-hours per month, 18,054. Total number of motors installed, 7.

Kilowatt-hour consumption for one year:

Month.	Kilowatt-Hours.	Month.	Kilowatt-Hours.	Month.	Kilowatt-Hours.
January	17,434	May	19,632	September	16,892
February	15,342	June	18,676	October	19,765
March	17,618	July	24,122	November	17,260
April	12,150	August	18,726	December	17,032

Annual load-factor 32 per cent.

Motor Installation.

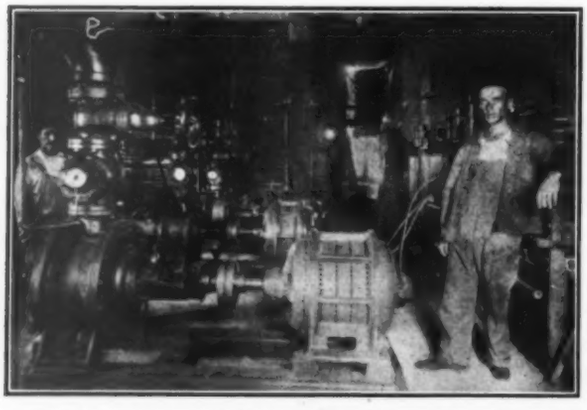
No.	Horse-power.	Speed R. P. M.	Application.
3	10	900	Each belted to deep-well pump (double acting) six-inch cylinder, 24-inch stroke, 22 revolutions per minute.
3	15	1200	Each belted to deep-well pump (double acting) six-inch cylinder, 24-inch stroke, 22 revolutions per minute.
1	30	1800	Direct-connected to centrifugal pump with capacity of 500 gallons per minute against 140 feet total head.

stallations are gaining headway, it will be found that the engineers (meaning the operating force) at a plant will oppose the introduction of electric drive. These men know that the installation of motors may mean the end of their jobs and consequently they do not favor helping anything which will throw them out of work. The difficulties in obtaining business may be greatly multiplied on this account and for this reason it is important that the central-station salesman or engineer should proceed cautiously in approaching these men. It is best to analyze the situation and get on good terms with the chief engineer. In this way accurate data can be obtained because the men lower down will not dare interfere.

In some cases, however, this may be the wrong step, due to the fact that the chief engineer may be a high-salaried man and consequently the first one to lose out in case a change is made.

Service and Rates.

Service to city waterworks systems is a preferred service and on this account the central station is entitled to a higher rate than in the case of a private business operating at the same load-factor and with the same power consumption. In the State of Texas the Fire Insurance Commission requires a central station to run duplicate power lines to a city water-pumping station and further requires duplicate installation in the central-station power house (that is enough units so that the station will continue to operate in case one unit is inoperative). The latter regulation affects few power houses in this period as the central station already knows that service is the paramount issue and is usually prepared properly. This regulation may be embarrassing, however, where a town is operated from a single-circuit transmission line. In order to maintain the same key rate as that earned by a steam pumping station with duplicate equipment installed, the central station must have two separate transmission-



Compact Arrangement of Motor-Driven Pumps In a Texas City Pumping Plant.

line circuits coming into the substation and then two distinct power circuits to the pumping station. No other power load can be connected to these lines due to the fact that a disturbance on another power customer's circuit might put the waterworks line out of commission. These rules seem a little rigorous, but it must be remembered that one disastrous fire due to the failure of a single line service might pay for many miles of line.

Most central stations now selling power in large quantities have rates based on load-factor and quantity. The city water-pumping plant should be so designed that it will earn a minimum rate on this standard power schedule. Rates for service usually vary from 3 cents to 1 cent per kilowatt-hour for towns of from 1,000 to 30,000 population, provided that the plant is properly designed. No demand charge is ordinarily made for special fire pumps.

Washington Electricians Want More Protection.

The State Public Service Commission of Washington was in session recently at Olympia and spent considerable time in threshing out technical problems concerning the service of electric companies. The meeting was adjourned to December 5 and will be held at Seattle, when it is expected that more tangible information will be obtainable. At this meeting representatives of electric power companies, telephone companies, cities, and electrical workers of the state will meet with the Commission and after the evidence has been assembled the final hearing will be held at Olympia on December 14.

Representatives of the electrical workers introduced at the conference held at Olympia on November 1 a set of proposed amendments to the overhead construction rules, all of them being designed to make construction safer. No action was taken on these amendments.

The proposed amendments to the overhead construction act were introduced by W. F. Delaney of the electrical workers. These would forbid a workman to work on a wire carrying more than 5,000 volts. One of the proposals provides for galvanized date nails, showing when poles are erected. All live metal parts adjacent to poles must be covered with three layers of weatherproof tape. Additional circuit-breakers, elimination of cradles, insulation tests of transformers and a more practical manner of determining loads are also provided for. It is recommended that the Public Service Commission obtain sufficient funds to keep three inspectors employed.

Opposition to Municipal Power Plant at Memphis.

The city of Memphis, Tenn., has sold its $1,500,000 bond issue authorized for construction of a municipal lighting plant and distribution system and, according to Mayor T. C. Ashcroft, will proceed with the expectation of carrying out the project, which will require a second bond issue of $1,500,000. There has a considerable amount of opposition developed among the technical men in the city and after careful consideration of the project a committee has reported advising that the project wait until prices of equipment, materials, etc., are reduced.

There is a clause in the contract for sale of the bonds by which the city could cancel the sale on payment of $15,000, and there is a feeling expressed that the city expects at the last minute to come to an agreement with the operating companies, the Merchants' Power Company and the Consolidated Gas & Electric Company. Both these companies have been conducting an advertising campaign in which they are pointing out their superior position to give the city cheaper service than could be provided by a municipal plant built at this time and compelled to go into competition. Negotiations as to a reduction in the existing rates have not been successful, the city holding out for a basis rate of 5 cents or its equivalent.

Elmer A. Sperry Addresses New York Electrical Society.

Elmer A. Sperry, of New York, addressed the New York Electrical Society at a meeting held in the Sperry Building in Brooklyn on the evening of November 22 before a record attendance of 350 members. Mr. Sperry's address was entitled "High Intensity Searchlight" and dealt with a detailed description of his projector which has caused so much comment in naval circles recently. At the close of the address Mr. Sperry conducted a very interesting demonstration of his remarkable lamp, which is credited with being the most powerful searchlight in existence. The demonstration was conducted on the roof of the Sperry Building and was visible for many miles.

Flood Lighting for Typical Civic Celebration

What May Be Done Effectively and Economically by Flood Lighting at a Civic Celebration Exemplified at the Two Hundredth Anniversary of Yale University

By L. C. PORTER

ON OCTOBER 21, 1916, Yale University and the city of New Haven, Conn., jointly celebrated the bicentennial of the establishment of the University in New Haven. The chief event in this celebration was the presentation of a pageant in the famous Yale Bowl. Some 4,000 people took part in this enormous play.

The pageant had been widely advertised all over the country and, as was expected, drew large crowds of people to the city. Forseeing that this would be the case, the local merchants decided to take advantage of it and at the same time further the celebration by some form of attractive civic display, in addition to decorations on the various stores.

Accordingly a committee consisting of representative business men was formed to take charge of the matter. They decided to decorate the famous old New Haven Green, once owned by the college and donated to the city. The scheme of decoration consisted of building a large band stand around the flag pole in the center of the green and running streamers of blue and white radially out therefrom. Four arches were erected as entrances to this festooned area, where the people could congregate and listen to good music.

The local central station recognized in these plans a good opportunity to make them more effective and at the same time help its business by lighting the decorations. Consequently the Illuminating Engineering Department of the Edison Lamp Works, Harrison, N. J., was called on for recommendations as to an effective lighting layout. In response to this call an engineer was immediately sent to New Haven to go over the matter and make suggestions to the committee.

As a result of this meeting it was decided to flood-light the entire decorated area of the green, causing this to stand out most prominently, but still leaving sufficient stray and reflected light, added to the street lighting, to show up as a background the beautiful buildings surrounding the green. Plans were drawn up accordingly and cost estimates made.

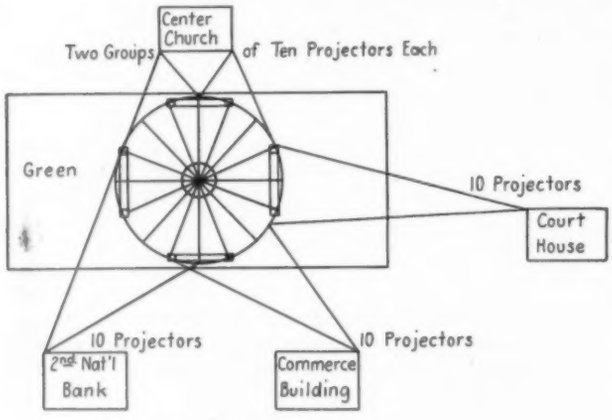
The method used to plan the illumination was first to pick out the locations for flood-lighting projectors which would meet the requirements. Then permission was obtained to use these and arrangements made by the central station to deliver power thereto.

Five stations around the green, as shown in the layout diagram, were selected, thus not only enabling better light distribution, but also eliminating the necessity of installing special transformers or heavy cables, as would have been necessary were the units all located in one or two positions.

Ten General Electric Company's form L-1 flood-lighting projectors, each equipped with a 500-watt Edison Mazda C flood-lighting lamp, were located at each of the five stations chosen and their beams so trained that they covered certain portions of the decorated area of the green, as indicated.

View of New Haven Green Flood-Lighted for Civic Celebration.

The illumination results were beautiful; the decorations stood out even more prominently than during the day and anywhere within this area persons could read with ease. One projector was trained on the flag at the top of the pole. The large illustration probably describes this lighting better than can be done in words.



Arrangement of Projectors.

In addition to the lighting on the green, one of the college dormitories, Vanderbilt Hall, was flood-lighted by means of 20 additional projectors, mounted across the street on the Union League. In the courtyard of Vanderbilt Hall is a large elm tree whose leaves had just turned a beautiful yellow. These, under the warm rays of the Mazda light, appeared as a mass of gold. Ten more projectors were mounted on the Quinnipiac Club and trained on another college building, Osborn Hall.

This celebration was a good example of what may be done by means of flood-lighting. For many years past it has been customary on special occasions to have fireworks or other more or less spectacular lighting effects, such as festoons, outlining and color displays. The result has been that while such displays are in themselves attractive, they fail to bring out the architectural beauty of many notable buildings, this being entirely lost to many who visit the city at night only. Fireworks also are of very short duration, and hence relatively expensive. Flood-lighting, on the other hand, may be continued as long as desired and it causes that on which it falls to stand forth at night perhaps even more conspicuously than during the day, by reason of contrast with the surrounding darkness.

Such lighting, where installed temporarily for special occasions, has frequently proven such an attractive, dignified means of advertisement, that it has resulted in permanent installations for such purposes, as the lighting of stained-glass windows, office and public buildings, monuments, playgrounds, trap shooting and military fields, night construction work, advertising matter, ice cutting and logging operations, automobile speedways, patrol duty, pageants, fire fighting, bathing beaches and many other similar classes of service.

There are on the market several makes of flood-lighting projectors, using various lamps, by means of which beams of practically any spread can be obtained, thus enabling the solution of any flood-lighting problem by using relatively inexpensive equipment, easy to install, requiring no expert attendance to maintain, and of reasonable upkeep cost.

Owensboro Makes Bid for Industrial Plants.

The city of Owensboro, Ky., with its own electric power plant, some time ago made a permanent offer of power to new manufacturing enterprises locating there, at one cent per kilowatt-hour. Now it is proposed by Mayor Hickman that the city go further than that and make an offer of free power and free water, for a term of years to be decided on, to manufacturers who establish new plants in that city. Action is yet to be taken.

Flood Lighting of Vanderbilt Hall, Yale University, During Celebration.

COMMERCIAL PRACTICE

New-Business Methods, Policies, Rates and Kindred Central-Station Matters for the Man Engaged in Selling Electricity

Cost of Electric Cooking in Minneapolis.

A recent advertisement of the Minneapolis General Electric Company contains some statistics showing the actual cost of electricity in households of various sizes where cooking is done electrically. The figures are as shown herewith:

Number in Family	Average Monthly Bill
Family of three	$2.62
Family of four	2.79
Family of five	2.82
Family of six	3.05
Family of seven	4.46
Family of eight	5.99

It will be remembered that the Minneapolis company in the spring of 1916 reduced its rates so that in the tertiary step all domestic customers secure electricity at a cost of 2.5 cents (less five per cent prompt payment discount) per kilowatt-hour. As a result of this rate the amount of electric cooking business secured in Minneapolis during the summer and fall has been gratifying, according to H. E. Young, sales manager.

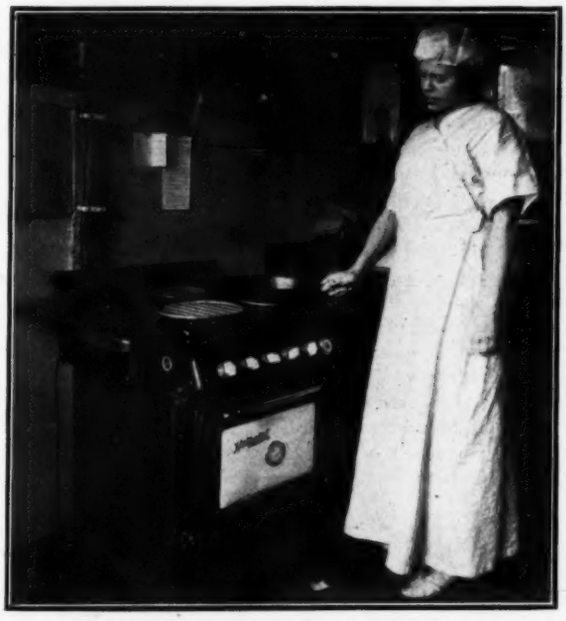
Electric Range Installed in a House That Rents for $2 Per Month.

While the Dayton Power & Light Company is not "boasting" of having on its lines any large number of electric-range customers, the company does claim at least one very interesting installation.

A short time ago a colored man visited the sales department of the company and reported that he had purchased an electric range and as he intended to use same, signed up for service and made a $10 deposit. The incident was rather unusual, therefore, after service had been installed and the range in operation, exterior and interior photographs were taken. One of the illustrations appearing on this page shows the exterior of the domicile of the electric range customer, which he occupies with his wife, at a rental of $2 per month. This view also shows the gas range which has been discarded for the more modern appliance.

Home of An Electric-Range Customer.
In this "house" lives a colored family who recently applied to the sales department of the Dayton Power & Light Company for service for an electric range which had been purchased. The house rents for $2.00 per month.

The electric range and its connections are shown in the interior view and also the wife "posing" for the camera. Apparently, the people of Dayton are well informed regarding diversified electric service and it will be of interest to learn later whether in this particular installation "the electric range has come to stay."



The Electric Range Installed.
The housewife gladly posed for this picture as she is enthusiastic over the electric range.

California Commission Compliments San Diego Consolidated Gas & Electric Company.

In concluding its recent decision in the rate case of the San Diego (Cal.) Consolidated Gas & Electric Company (a subsidiary of the Standard Gas & Electric Company, under Byllesby management), the Railroad Commission of California said:

"The testimony shows that the San Diego company's policy toward its consumers has been praiseworthy. The company has voluntarily made reductions in rates from time to time, has been liberal in the construction of extensions at its own expense and has exerted itself at all times to give to its consumers good service. The number of informal complaints against the San Diego company which have come to this commission has been relatively very small. A public utility which pursues such a fair and reasonable policy in its conduct toward the public is entitled to consideration from the public authorities charged with the duty of supervising and regulating public utilities."

Results of a Heating-Device Campaign in Birmingham.

Speaking before a convention of southern central-station representatives in Tampa, Fla., last week, Frank Hammond, general agent of the Birmingham (Ala.) Railway, Light & Power Company, pointed out the importance of the heating-device load. The rapid growth of the electrical industry has been so wonderful that it is a difficult matter for the average layman to conceive the possibility of what may be accomplished with electricity through the medium of heating devices. Therefore, because of his lack of knowledge of the existence of an electrical appliance that would supply his need, he permits himself to do without entirely or uses some medium far less convenient. But the electrical fraternity has made remarkable strides during the few years of its existence in advertising the uses of electrical heat.

"The dealers and central stations of every city should encourage 'America's Electrical Week' not only as a temporary gain but because of the magnitudinous prospects of the future," according to Mr. Hammond. "The electrical shows alone exhibit appliances that many people would never see or hear of otherwise, and it is another means of keeping the electrical men themselves awake to the latest models and methods of such devices.

"Some of our contemporaries have advanced the idea that the sale of a large number of devices, especially irons, does not indicate that more than a very small percentage of same are actually in use. There was one Southern city that put on a special sale of irons and disposed of 350, and the addresses of 290 buyers were placed on file. Six months later a canvass of these 290 consumers was made, and it was found that 63 per cent of these irons were in use on an average of two hours per week. The other 37 per cent had either moved, or the iron was stored away."

The Birmingham Railway, Light & Power Company put on a very successful heating-device campaign during the past summer, with the assistance and co-operation of a manufacturing company. A heating device expert was sent to Birmingham to manage the campaign, and a corps of salesmen were started out on a house-to-house campaign, and their efforts resulted in the sale of 1,197 heating devices, exclusive of irons. These sales consisted largely of toasters, percolators, etc., but did not include ranges or air heaters. These installations will be followed by larger devices that will mean more to offset the peak load.

Twelve Ranges a Week Sold in Kalispell Electric Range Campaign.

The electric range campaign of the Northern Idaho & Montana Power Company, Kalispell, Mont., continues to produce excellent results. Ranges are being sold at the rate of more than 12 per week and arrangements have been made to hold demonstrations one day each week in the company's office at Kalispell. "One of the gratifying features of the campaign," says Manager MacDonald, "is the fact that ranges distributed in the different parts of the city always sell others in that neighborhood."

Electric Company to Assist Lighting of Statue of Liberty.

The Public Service Electric Company, Newark, N. J., has placed models of the statue of liberty in its commercial offices throughout the state to assist in the movement to secure a fund for the illumination of the statue at night. The statues in miniature are arranged as coin repositories for consumers and others in tendering their contributions.

There Is a Field for Sign Lighting in Every Community

!!! SAVE YOUR LIVES !!!
THIS SIGN MAY SAVE YOUR LIFE TODAY.
All The Precautions In The World Will Not Save The
Lives Of Those Who Drive Automobiles Recklessly
Over Railroad Crossings.
When Approaching A Crossing Please Stop. Look. & Listen.
We Are Doing Our Part. Wont You Do Yours ?
LONG ISLAND RAILROAD.
!!! SAVE YOUR LIVES !!!

To impress upon automobilists and others the great necessity for care and precaution when approaching and passing over grade crossings, the Long Island Railroad has devised a new and effective type of illuminated warning sign for its electric system, which crosses many popular highways on Long Island. This sign, shown above, is 60 feet long and 20 feet high, with largest letters about 48 inches in height; the letters are red and black on a pure white field. Illuminated at night with six high-powered electric lamps with reflectors, it is possible to see and read the signs a considerable distance ahead. Warning signs of this type have been erected over the principal highways crossing the company's lines, particularly in advance of dangerous grade crossings, and have proved highly efficient for the desired purpose. Beyond the safety advantages of this sign installation, it indicates a new and interesting field for long-hour lighting service for the central station, being illuminated from dusk until daylight.

ELECTRICAL CONSTRUCTION

A Department Devoted to Problems Relating to the Installation, Operation and Maintenance of Electrical Equipment

AUTOMATIC STORAGE-BATTERY CHARGING SWITCHBOARDS FOR FIRE-ALARM SYSTEMS.

By George A. Broder.

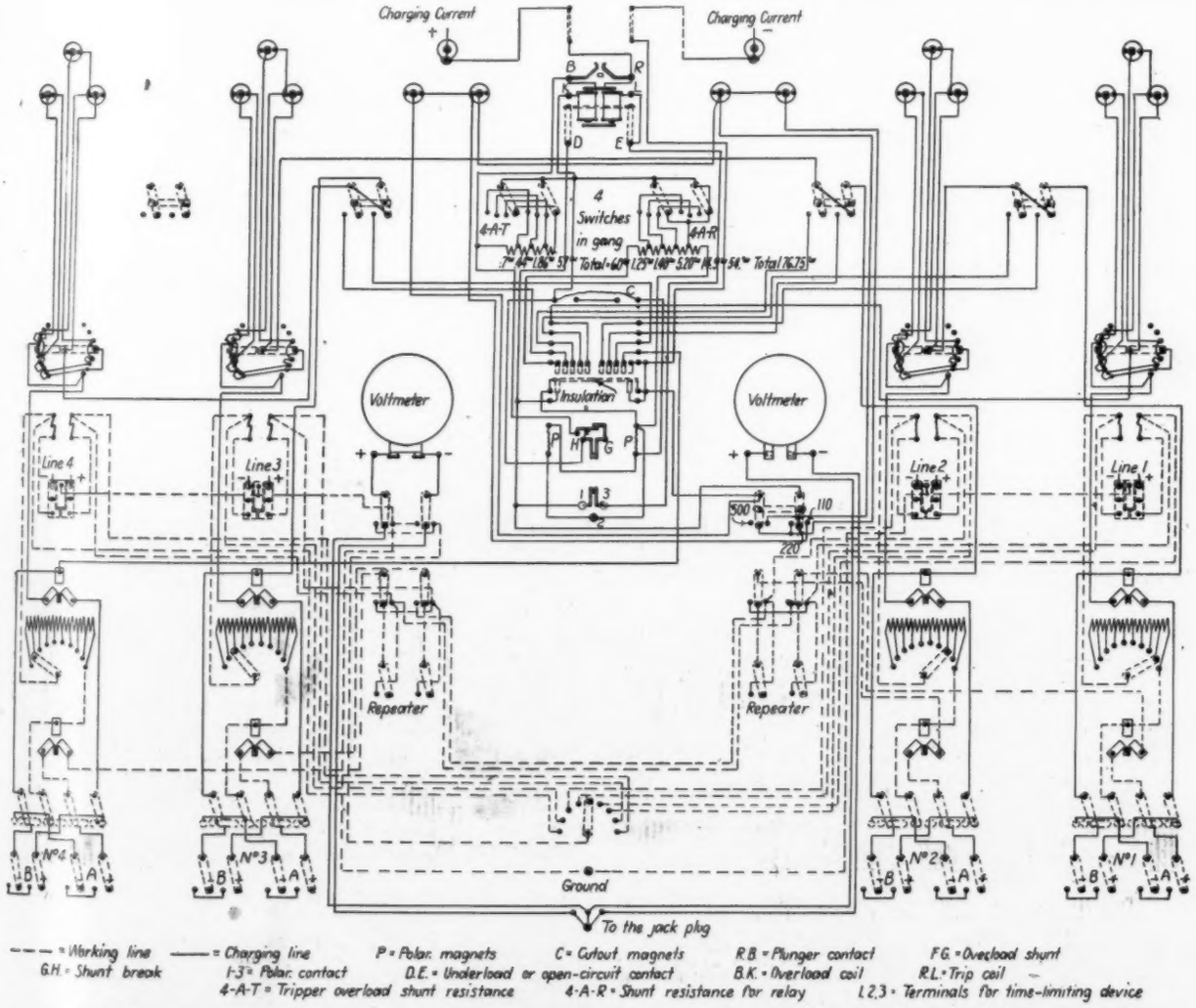
For important signaling systems, such as public fire-alarm and police-telegraph circuits, it is essential that a source of current be used that is absolutely dependable at all times, which maintains constant voltage on the lines and eliminates the liability of disturbance to them from erratic behavior of the source. The storage battery is the only electrical source that meets these requirements fully. Storage batteries, however, require proper care in charging at regular intervals, which care can be provided for automatically to a large degree by a special design of charging switchboard.

To satisfactorily meet the requirements of charging storage batteries, and protect them from injury due to overcharge, undercharge or reverse polarity, the Gamewell Company, of New York, has developed a unique type of switchboard to be used for fire-alarm or other systems where storage batteries are involved.

As shown by the wiring diagram (Fig. 1) and the general view (Fig. 2) of a four-circuit automatic unit-type switchboard, each charging and working circuit is complete in itself and entirely independent of all others. At no time is the charging circuit connected to the working circuits or the latter opened when changing from one set of storage batteries *A* to the other set *B*, as explained below.

Where two or more sets of batteries are charged in parallel, or series-parallel, their terminals must be separated at the end of the charging period to prevent the sets of higher potential discharging back through those of lower potential.

As shown by Fig. 2, the relay in the center, having bus-bars in the front and actuated by a pair of pick-up magnets,



— — = Working line —— = Charging line P = Polar. magnets C = Cutout magnets R.B. = Plunger contact F.G. = Overload shunt G.H. = Shunt break 1-3 = Polar. contact D.E. = Underload or open-circuit contact B.K. = Overload coil R.L. = Trip coil 4-A-T = Tripper overload shunt resistance 4-A-R = Shunt resistance for relay 1,2,3 = Terminals for time-limiting device

Fig. 1.—Wiring Diagram of Four-Circuit Automatic Storage-Battery Switchboard with 0.75-Ampere Charging Capacity.

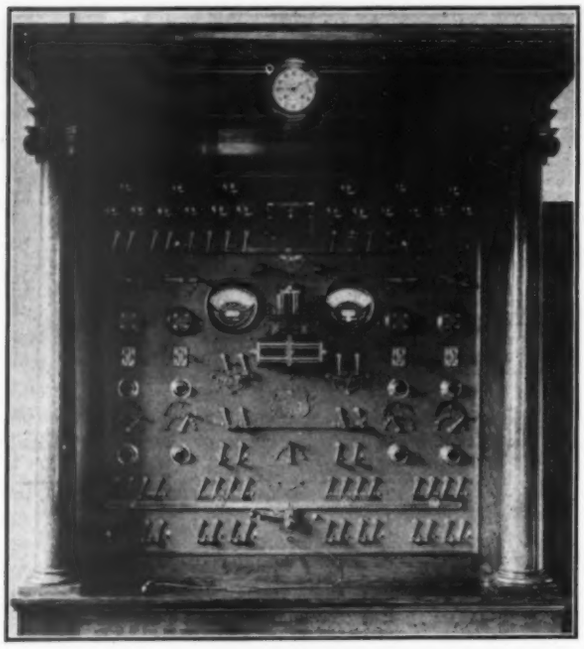


Fig. 2.—General View of Board Whose Circuits Are Shown in Fig. 1.

makes contact with the upper springs, which connect to the different battery sets, when charging, and rests in the lower or starting position when the charge is completed.

There are three variable charging rates available, varying from the minimum when all circuits are charging in series to the maximum when all are in parallel. When the pointer on the gang switch bar shown below the charging knife switch is set over any one of the ampere rate columns it means that the charging current will be cut off when the lowest figure is reached or when the highest figure is exceeded, thus giving a range of about one ampere for line-voltage variation.

The double-pole switches to the right and left at the top are for connecting the different battery sets in series, parallel, or parallel-series groups, thereby connecting them for the greatest economy of charging.

To adapt the switchboard for voltages ranging from 110 to 500 volts, a voltage rate switch is provided whereby 110, 220, 500 or any intermediate potential may be used according to the direct-current source available.

Each charging circuit has a seven-step rheostat controlling three 100-watt Gem lamps or resistance spools in each battery circuit and connecting them in six different combinations ranging from three in series to three in parallel, giving 0.3 to 3 amperes, respectively.

As shown by the large wiring diagram (Fig. 1) and the schematic detail sketches (Fig. 3), there are three separate features accomplished by the automatic relay. All devices are normally in the starting position where the main switch is open. Upon closing the switch a shunt circuit is formed by contacts *F, G, H,* preventing this magnet from tripping the main switch before it latches in place.

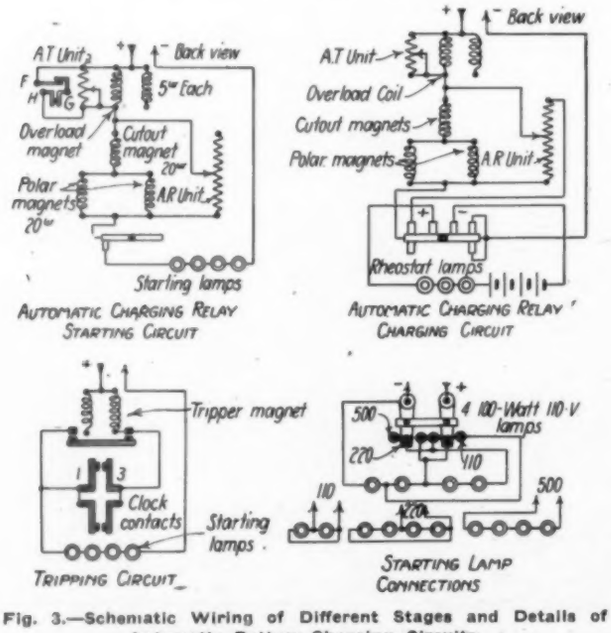


Fig. 3.—Schematic Wiring of Different Stages and Details of Automatic Battery-Charging Circuits.

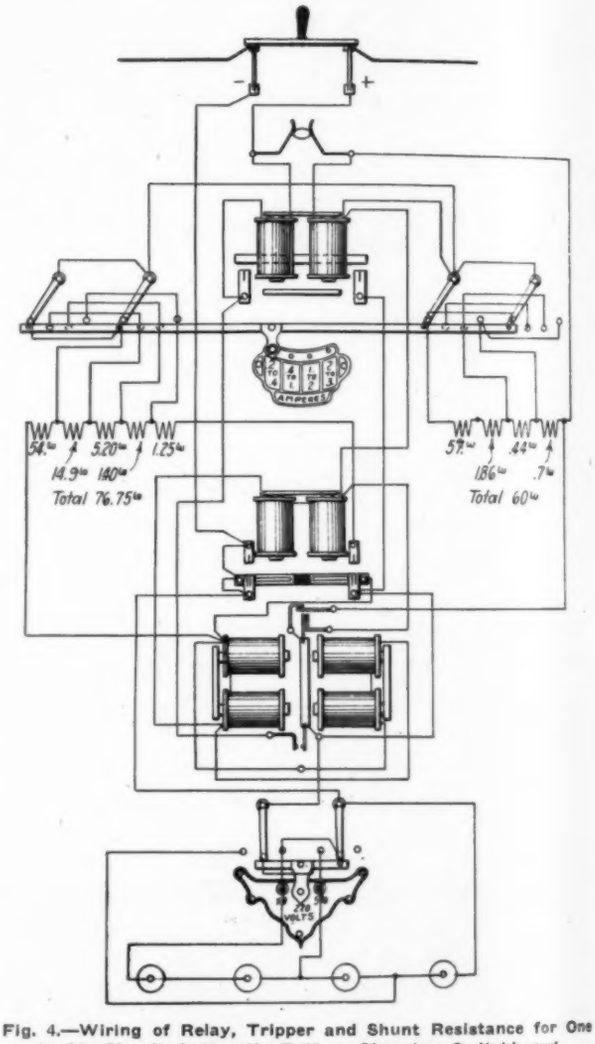


Fig. 4.—Wiring of Relay, Tripper and Shunt Resistance for One to Six-Circuit Automatic Battery-Charging Switchboard.

The starting current is about 1.5 amperes and has two paths, one including the resistance which shunts the overload coil and the resistance shunting the cutout and polar coils, the latter being of such a value at each step as to maintain about 0.2 ampere through the pickup magnets. The currents passed by each circuit are inversely proportional to their resistance. They unite at a common point on the pick-up-relay busbar, pass to the lower left-hand brush through the four 100-watt starting lamps, which are grouped in various combinations by the voltage rate switch, and return to negative side of the charging line.

If the current corresponds to the set value, the pickup-relay armature is attracted, breaking the starting circuit and

completing the actual charging circuit. Current now flows first through the five-ohm overload magnet and its shunt resistance. The armature of the overload trip magnet is adjusted so as to be attracted when the current in this coil exceeds 0.4 ampere and thus instantly to open the main knife switch. Providing the polarity and value of the charging current is correct, the batteries in each circuit commence charging through the lamp rheostat in each circuit, which is set to give the proper charging rate according to their condition.

The tripping or emergency devices are operative from three different points, as shown by the diagrams. The five-ohm tripping magnet to the right and on a common yoke with the overload magnet is operated by the polar-relay contacts; upon reverse polarity a polarized U-shaped armature acts to complete the circuit through the four starting lamps and this relay, attracting its armature instantly and opening the knife switch similar to the overload device.

If the charging current is momentarily interrupted or the voltage falls below normal, the pickup or cutout-relay armature, by operating at each interruption, actuates a ratchet and pawl device which after 12 or more such interruptions closes a circuit through the tripping-magnet winding and actuates its armature to cut off the supply similarly to the polar and overload devices already described.

When desired, a charging clock may be attached to cut off the charging current at the end of any set interval, being connected to terminals 1, 2, 3 on the rear of the switchboard. The clock movement acts to close a pair of tripping contacts, which are in multiple with the polar-relay contacts, and act in the same manner to open the main switch.

The gauged switches operated by the indicating handle and gear shown near the bottom are for changing from one set of batteries to the other, when the four switch arms in each circuit move over the eight contact buttons. First the charging circuit is opened, then the two sets of batteries are put in parallel on the working circuit, and in moving farther the charged set is left on the working line while the discharged set is connected to the charging circuit. The two double-pole switches on each circuit at the bottom control the individual sets of batteries; when thrown to the "off" position the corresponding battery is disconnected and the circuit is maintained through a jumper connection.

Outside lines connect to a combination terminal plate where they may be opened or grounded. A 180-ohm line rheostat of nine 20-ohm steps is for inserting artificial resistance into the working circuits, which are protected against excessive or foreign currents by a 0.5-ampere German-silver fuse.

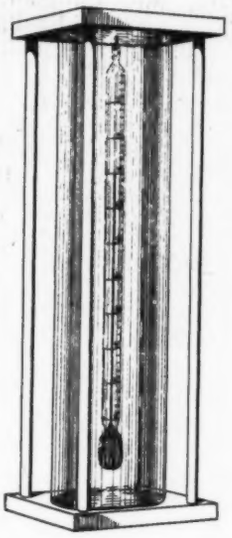
There is a combined armature and voltmeter jack in each charging and working circuit into which a three-way jack plug may be inserted to indicate the voltage and current values of each circuit.

All switches and contact buttons are finished in brass or copper and mottled rubber is used for insulation on gang bars. All the switchboard equipment is mounted on one-inch slate or marble slabs in one piece up to the twelve-circuit size.

Testing Thermometer Protected from Irregular Air Changes and Drafts.

In the manufacture of power equipment, practically all machines are run through a series of tests before they are pronounced satisfactory for use. Similarly, before acceptance, important apparatus is tested after installation to see whether guarantees are fulfilled. The making of these tests involves considerable equipment, including numerous meters, thermometers, etc., for taking readings from which the rating and capacity are determined.

In many types of power apparatus, especially electric generators, motors and transformers, the rating and capacity are determined by temperature rise, the withstanding of the load without excessive heating. Accurate thermometers are required for this class of work, and many tests are based on a knowledge of the average temperature of the room. Ordinary exposed



Protecting a Thermometer from Drafts.

thermometers cannot be depended on for this work, as they are affected by every slight draft, and for tests requiring readings at intervals the results would not be accurate nor reliable.

To overcome this difficulty, a thermometer can be rigged up as illustrated that is not subject to these irregular changes. A two-inch-diameter glass tube is mounted on and secured to a square piece of one-fourth-inch fiber board. The tube is then filled with a light grade of clear transformer oil (kerosene will do) and an ordinary spirit thermometer suspended from another piece of fiber board is submerged in the oil.

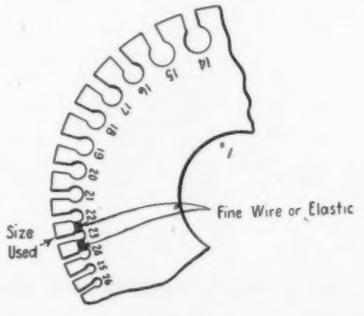
The top and bottom fiber plates are then clamped to the tube with three-sixteenth-inch bolts and all cracks filled with sealing wax to prevent leakage.

Mounted in a handy place, this makes a convenient thermometer and, being protected from drafts, can be relied on as accurate.

J. C. Grindell.

Time-Saving Marking of Wire Gauge.

In shops where it is necessary frequently to test one or two sizes of wire with a wire gauge, considerable time and eye-strain can be saved by marking the size most commonly used in a manner similar to that shown. Thus this size can be readily found without looking at the small



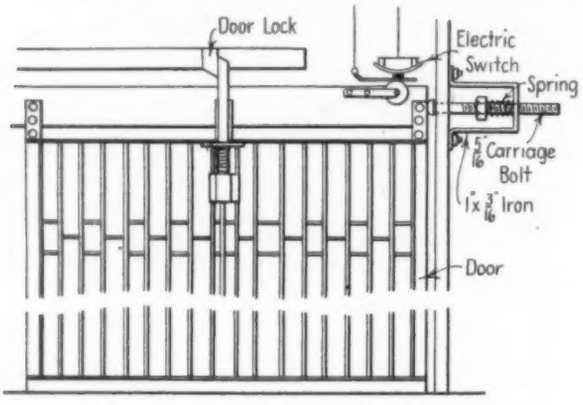
Simple Way to Mark a Wire Gauge.

figures on the gauge, which can not be seen properly except in a good light. If two or three sizes have to be marked, differently colored threads or wires can be used for the different sizes.

Benjamin Swanson.

Additional Safety Device for Electric Elevator.

The accompanying sketch shows how an additional safety device was installed on the door jamb of a passenger elevator. It is very simple, but has proved valuable. The device makes it impossible to fail to lock the door properly, as the spring used is strong enough to push the door off



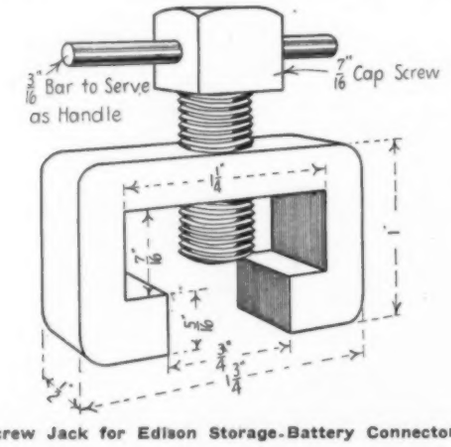
Auxiliary Safety Device for Passenger-Elevator Door.

from the electric switch and thereby prevent the car from being started.

When the electric switch was first installed it was thought absolutely safe, but on several occasions the door was closed enough to close the contact on the switch, but not enough to lock the door. Consequently when the latter was moved by someone, of course this broke the circuit and the car was stopped between floors, thus making a dangerous condition. Since installing this device we have had no further trouble. P. L. Cooper.

Screw Jack for Removing Edison Cell Connectors.

We have a set of Edison storage batteries in the plant where I am employed. I have to disconnect the cells occasionally in order to clean off thoroughly with a steam blast the dirt which settles on the tops of the containing cans. As the connectors are slightly tapered to fit the cell terminals tightly, it is quite a job to remove the connectors. I therefore made a screw jack as shown in the sketch herewith. This can be made out of any piece of



Screw Jack for Edison Storage-Battery Connectors.

iron of the outside dimensions shown, or slightly larger. The middle part can be cut out by drilling holes through same and filing to the shape and size shown. This little tool I have found to be invaluable. It does the work quickly and very well, without injuring in any way the tops of the connecting posts. E. G. Quarnstrom.

Among the Contractors.

A new electric shop is to be opened in Salinas, Cal., by J. Anderson and G. M. Doyle.

Cates & Shepard, Philadelphia, Pa., have been awarded a contract for electrical work in the new school to be erected by the Ridley Park School District, Pa.

J. H. Benton, of the Fowler Electrical Supply Company, Toledo, O., reports the completion of the wiring for lighting of the Mott Avenue and Ironville Schools in Toledo. The wiring for lighting and power in the new building of the Clover Leaf Dairy Company, of Toledo, amounting to $2,000, has also been completed. The wiring of the Chevrolet plant, for lighting and power, has been started by the same concern, at the contract price of $6,000, and an electrical double-lift bridge has recently been erected in Baltimore, Md., at a cost of $9,000. The United States Government has awarded the contract for the erection of an electrically operated bridge over the Louisville and Portland Canal, at Louisville, Ky., to the Fowler company. The bridge will be a swing drawbridge, equipped with patent roadway gates, also operated by electricity and so devised that the draw cannot be swung without the gates being down. These gates will have push-button remote-switch control with automatic stops.

The firm of Henry Newgard & Company, Chicago and Milwaukee, has secured the following contracts during the first half of November for electrical work in Milwaukee, Wis., through its office in that city: Parry Grain Company, grain elevator, 176 horsepower in motors and 140 lamps. American Hide & Leather Company, tannery, 52 kilowatts in generators, 75 horsepower in motors, 56 lamps and a switchboard. Stratford Arms Hotel, a total of 1,095 outlets, besides 15 intercommunicating telephones and conduits for 180 public telephones. City Club of Milwaukee, 212 outlets and three horsepower in motors. J. Strass, store and office building, 380 outlets. B. J. Johnson Soap Company, four 900,000-circular-mil cables from new engine room to warehouse, a distance of 815 feet; also running two 1,000,000-circular-mil cables to the old building adjoining the new concrete structure; also installing 125 horsepower in motors and 900 lamps; the main electrical work in this plant was described in the issue of July 29, 1916.

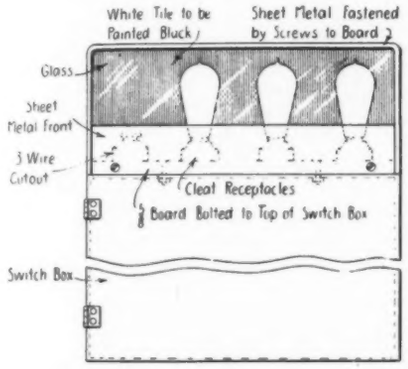
The new seven-story administration building of the Willys-Overland Company, Toledo, O., was recently completed. J. J. Duck, 430 St. Clair Street, Toledo, secured the contract for installing the fixtures and for the wiring of the building at $25,000. The electrical equipment and appliances cost $100,000. The building, according to Mr. Duck, has the largest varied electrical installation in the world, containing floor outlets for desk lamps, base plugs, push switches, Bell and Ohio State telephone conduits, annunciator calls, watchman calls, vacuum clearner outlets, electric clocks,. electric elevators, fire signal calls, writing telegraph instruments, adding machines and dictating machines operated by electricity, motors for ventilating and ice machines, complete motor equipment for the model kitchen, such as dish washers, potato peelers, ovens and the like. Special lighting arrangements, motion-picture outlets and remote-control switches for lighting the auditorium have also been installed. An electric sign, 154 feet long and with letters 12 and nine feet high, to read "The Willys-Overland Co." has been purchased by that concern from the Toledo Railways & Light Company, and will be erected on the roof. Placed conspicuously wherever workmen congregate inside and outside of the factory is an electric American flag. Eight of these flags have been erected and eight more ordered.

DOLLAR WIRING KINKS

Every reader is invited to contribute to this page. It does not matter how few words are used to explain a "Dollar Wiring Kink," provided the idea is made clear; if a diagram is necessary, a rough pencil drawing will serve. The idea itself must, of course, be new and bright. A dollar will be sent to the contributor upon publication.

Neat Installation of Ground Lamps.

The following method of installing ground lamps may prove helpful to some who have to solve the question of having the lamps in sight and yet have them look near. We installed a three-phase system in a mill. The main switch to control this was in the engine room. It was installed in a metal switch box on a white tile wall, the wiring coming through the wall at the back of the box in conduit and returning in the same way. The engine room seemed to be the only place where the lamps would always be visible and yet we had nothing but a white wall for a background which is a very poor place to do "any old kind of a job." The accompanying sketch shows how we did it. A five-eighths-inch board was bolted to


White Tile to be Painted Black
Sheet Metal fastened by Screws to Board
Glass
Sheet Metal Front
3 Wire Cutout
Cleat Receptacles
⅝ Board Bolted to Top of Switch Box
Switch Box

Method of Mounting Ground-Indicating Lamps in Compartment Above Main Switch Box.

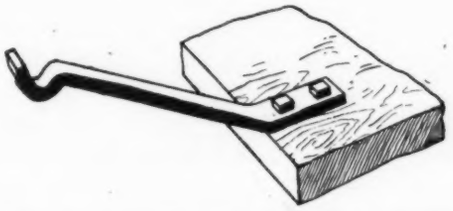
the top of the box. A strip of sheet metal was bent as shown and fastened at its lower end to the board by screws. This formed the sides and top of the lamp compartment. To hide the lamp receptacles and cutout, a strip of sheet metal was similarly fastened in front. This also held in place a sheet of clear glass cut to close the remainder of the front and thus to keep out dust. The rear wall of the lamp compartment was painted black to conform with the switch box below it and to make the lamps stand out more conspicuously when lighted than they would against the original white background. A few holes drilled in the sides and top give ventilation, or, if preferred, the glass window in front may be left out. This would require frequent cleaning of the lamps, however. Arthur S. Nickerson.

A Serviceable Home-Made Hickey.

Not many of us are fortunate enough to be supplied with a good and rugged factory-made hickey, but have to be content with a four-foot length of one-inch pipe with a one-inch tee on the end. For one-half-inch pipe this form of hickey is strong enough, but it soon breaks under the strain of bending three-quarter-inch pipe. It can be greatly strengthened by driving a one-foot piece of three-quarter-inch pipe into the tee end of the hickey before the tee is put in place. It will be necessary to run over the one-inch thread with a die after the three-quarter-inch piece is driven in, as the tight fit expands the hickey. This hickey handle fitted with a strong tee will solve the broken hickey problem. C. Rubner.

Armature Supporting Arms.

When winding or repairing armatures of electric motors ranging in size from 0.5 to 4 horsepower or generators ranging from 0.3 to 3 kilowatts, a pair of the supporting arms shown in the sketch can be very conveniently used. This arm is made of a piece of iron two inches wide and one-

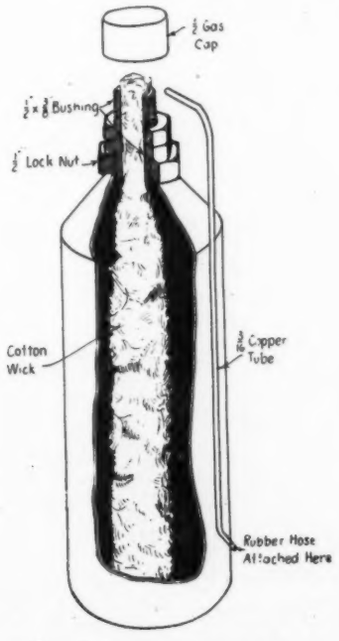


Bracket for Supporting Armature During Repairs.

half-inch thick, bent as shown. Two bolts in each arm hold it securely clamped to the work bench. These arms require no floor space and allow a man to work closer to a bench than any other form of supports known to the writer. R. L. Hervey.

Home-Made Alcohol Torch.

An alcohol torch is often very useful in soldering small joints. One that can be cheaply made by any electrician is shown in the accompanying sketch. The following material is required: A small metal-polish can; a one-half-inch locknut; two brass bushings, one-half inch by three-eighths inch; a one-half-inch gas cap; a short piece of three-sixteenths-inch copper or brass tubing. Solder the locknut to the opening in the can. Solder the two flanges of the bushings together as shown. Then force a cotton wick through the bushings which form the burner. Screw this burner into the locknut. Solder the small copper tube to the side of the can; this forms the blow pipe,



Simple Home-Made Alcohol Torch.

a piece of rubber tubing fitting on its lower end. To fill the torch unscrew the burner with its wick from the locknut. When the torch is not in use, screw the gas cap over the burner to prevent waste of alcohol by evaporation. Such a torch is handy and inexpensive.

Robert Patterson.

THE DEALER AND STOREKEEPER

An Exchange of Ideas and Experiences on Advertising and Selling Methods, and Store-Keeping for the Dealer in Electrical Goods

Co-Operation of Manufacturer and Dealer to Cash In on Electrical Week.

Close co-operation with the plans of the Society for Electrical Development for America's Electrical Week is the keynote of the Western Electric Company's activities for the fall months. This will be evidenced in the company's extensive advertising campaign in all usual publicity channels and in the active participation of its representapany's on the local committees in the cities where its distributing houses are located. The traveling salesman will also co-operate with all the other local committees that are at work in smaller towns.

The advertising, which has been planned to exceed in scope that carried out during Electrical Prosperity Week, will be directed not so much to electrical devices suitable for Christmas gifts, though their usefulness for that purpose will not be slighted, but rather for their all-the-year-round utility. The advertising in popular magazines will particularly feature these devices as the solution of the ever-growing servant problem.

The company has a more complete line of electrical household appliances to present than ever before. This line is made up of a new portable electric sewing machine, the Junior range, a new electric iron, a washing and wringing machine, vaccum cleaners, electric ranges, vibrators, toasters and many other electric heating devices.

A feature of the Junior range campaign is an attractive cutout 30 inches high, lithographed in natural colors, showing two children, life-size, with an actual range from the stock of the dealer who is making use of the display material.

The Western Electric flood lamp is being recommended for use in connection with the observance of Electrical Week for the illumination of parades and public buildings. The selling campaign for this apparatus will be supplemented by appropriate literature.

Popular magazines will be used to a very considerable extent for calling the attention of the buying public to Western Electric household helps. All such national advertising will consistently direct prospective purchasers to their local dealers or central stations as the source of supply. This is one way in which the company desires to co-operate to the fullest extent with those handling its products by greatly furthering the demand for goods bearing its name.

Another form of dealer co-operation will be found in a mailing folder which is being sent to dealers and central stations. This folder, entitled "Cashing In on A. E. W." describes the company's leading electrical specialties and fully outlines the extensive variety of advertising helps—newspaper printing plates, folders, booklets, lantern slides and display material—that will be furnished gratis to assist the dealer in his local sales work. A liberal policy in regard to supplying these will be the rule.

America's Electrical Week will be unprecedented in the activities that will result by way of stimulating interest in electrical devices and the Western Electric Company's plans to co-operate with dealers to enable them to cash in on this interest to the fullest extent.

The Trend in Buying Christmas Gifts Is Toward the Practical.

The near approach of Christmas ushers in what should be a most happy as well as profitable season for the merchant. As show windows and store interiors begin to take on their holiday garb, a spirit of cheerfulness and good fellowship seems to permeate the very atmosphere.

The drift in gift buying is more and more toward the practical. This means that the electrical dealer's store as a haven for Christmas shoppers is continually increasing in popularity. However, the amount of this worthwhile, permanent customer business to be corralled depends largely upon the goods featured.

The sales letter is now in quite common use among retailers, especially at Christmas time. The Christmas sales letter is just a little different from ordinary mail solicitation. In this case the dealer is not appealing to the individual to buy something for himself, but for someone else, so the angle of approach varies somewhat.

For several years the Hoover Suction Sweeper Company has been making a strong drive on its product as a suitable Christmas gift, and has prepared the following letter which should be productive to the dealer endeavoring to please the man who is thinking "What shall I buy my wife for Christmas?"

> "This is a question you've doubtless given much consideration to at this time.
>
> "Naturally you don't want to throw away your money—you want to present her with something that is useful and that will be a constant source of pleasure and satisfaction.
>
> "Nothing would please her more than a Hoover Suction Sweeper—the modern cleaning machine that has become a necessity because of its convenience and thoroughness.
>
> "A woman owning one of these efficient, time-saving articles is happy in the knowledge that her household can so easily be kept spic and span, and that her husband is interested in her pleasure and well-being.
>
> "Think what it means to her on cleaning day to be able to clean the rugs and carpets on the floor without raising dust.
>
> "In ease of operation and thoroughness the Hoover is unsurpassed. That quality distinction so apparent in all our lines is strongly in evidence here.
>
> "You'll also find here many other articles that make excellent gifts.
>
> "See us at once and get this Christmas problem off your mind."

Such a letter is a sure means of trade-building. It can be applied to any of the electrical lines.

Manufacture of Electric-Lighting Fixtures Shown in Toledo Window Display.

An interesting display in the windows of a Toledo lighting-fixture manufacturer has been attracting considerable attention lately, being designed to show the various steps in the manufacture of electric-lighting features. The display indicates the work of the fixture manufacture from the plaster modeling, pattern making, molding, casting, spinning, and the finishing and assembling operations.

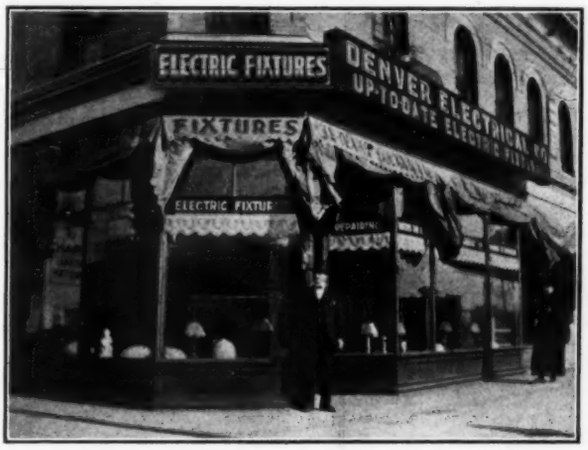
Modernizing an Electric Fixture Store

Reconstruction of Denver Lighting-Fixture Store Results in Attractive and Appropriate Interior Arrangments that Prove of Valuable Aid to the Merchandising Power of the Establishment

By IRA R. ALEXANDER

THE Denver Electrical Company, 139 Fifteenth Street, Denver, Colo., has just finished reconstructing the interior of its place of business, and this reconstruction has transformed it into one of the finest and most modern electric fixture stores in the country.

The store is situated on a corner within a stone's throw of the Denver public library, the civic center, court house and state capitol building—in fact, it is in plain view of many thousands of people who pass daily. Many different street car lines from the residential districts of East and South Denver, as well as lines going to a number of suburban communities, pass in front of the Denver Electrical Company's store. All other kinds of traffic are very heavy also.



To attract attention from these passersby the company has arranged the exterior of its store with the view of having it impress those people with its individuality—for it does possess individuality. The store stands forth from those around it, because its exterior arrangement is different from the other places of business near it. The arrangement is also one that speaks of quality. This latter fact, taken with the attractiveness of the store in drawing attention from those passing it, gives the concern some mighty good advertising in itself.

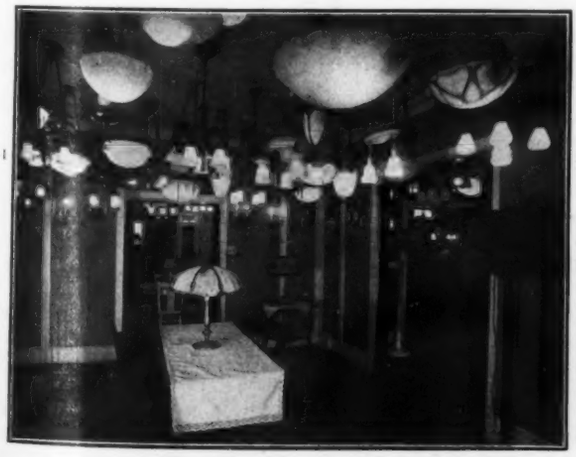
In the windows of the store are displayed lighting fixtures of different types. These are displayed in such a way so as to call people's attention and at the same time give them some idea as to the kind and quality of electric fixtures offered for sale. A part of the window display section is boxed up, while the other part is not, enabling one to see inside the store to some extent, which serves as an invitation to enter the store.

On entering the store one finds himself in the office of the company. Here the routine business of the concern is transacted, but that is not all. The room also serves as a display room, as the ceiling space of this room is used to good advantage as a place to hang a few samples of the latest in electric fixtures. The walls of this room are tastefully decorated and hung with pictures, and the woodwork, as is also the case in the other rooms, has an ivory finish.

The room opening out of the office and directly opposite the entrance is the general display room. In this room are displayed fixtures for the dining room, for the living room, for the reception hall; in fact, here one may find a fixture that would be suitable for any purpose. The wall of this room is papered in putty-gray-colored paper which helps to show off the fixtures on display to very good advantage. As another aid, easy chairs, a table, a stand and a rug are included in the furnishings. These factors help to give the home-like atmosphere which is so essential in aiding a person to choose lighting fixtures for a home.

From the end of the general fixture room opens the "Blue Bird" room. The walls of this room are covered with blue paper, while the dining table and chairs are ivory in color to match the woodwork. The table, as well as the lamp that stands on it, are decorated with blue birds. While the room is small, being only about 12 feet square, it is one of the most attractive in the entire store. The arrangement and decorations set off to good advantage the many dining-room, ceiling, wall and table electric-lighting fixtures.

A room opening from the side of the general fixture room and corresponding to it in size, is a larger dining-room



View in the General Display Room and in the Room Used for Exhibiting Dining-Room Fixtures.

fixture display room. Of course, all fixtures shown in this room are not for dining-room use, but for the most part they are. In the center of this room stands a conventional dining-room table with four chairs. A home-like atmosphere is presented. The walls are papered with brown paper, with the ceiling a lighter shade. The combination is one that displays to good advantage the fixtures in the room.

Display Rooms Have Home-Like Atmosphere.

Opening from one end of this room is the room in which are displayed electric-lighting fixtures suitable for use in bedrooms, while opening from the other end is the Colonial room. The former has its walls covered with old-rose-colored paper. There is no furniture in this room, and the lighting fixtures are hung from the ceiling, fastened to the walls, and displayed on shelves. These shelves are built against the walls and are about four feet from the floor, being one foot wide. Curtains are hung from these to the floor and behind these curtains considerable space for storage purposes is afforded.

The Colonial room has a goodly assortment of electric-lighting fixtures that are suitable for colonial homes. They are well set off by the furniture and decorations of the room. Pictures hang on the walls, a rug covers the floor

Combined Office and Display Room of the Denver Electrical Company.

and the table and chairs and the like we find working into the scheme of making this room just as home-like as are the other rooms. This room also opens into the office, and is the only display room, aside from the office, that has an outside window. When the curtains to this window are pulled aside a person can stand on the sidewalk outside and see into three rooms of the store—namely, the Colonial room, the large dining room, and the room in which the bedroom fixtures are displayed. This feature serves as a drawing card for the store.

In all the rooms the ceilings are low enough to allow close inspection of the ceiling fixtures. This in itself is a big factor in the successful arrangement of the modern lighting-fixture store of today. In all the rooms the home-like idea is carried out and in inspecting the store one would imagine that he was visiting the home of some friend instead of being in a place of business. This fact serves to better judge how the lighting fixtures will look in a person's own home, and at the same time it creates a cheerful atmosphere that puts a person in a better frame of mind and makes selling fixtures a much easier task.

All the display rooms are provided with electric switches and one needs but press these to light the different electric fixtures on display. It is the policy of those in charge of the store to keep the lights off in the rooms that are not occupied. This is an item that helps keep the expense bills down. If there is any certain fixture that is not in the display rooms that a prospective purchaser has in mind that the concern has in their storeroom it is but an easy matter to substitute it for some fixture already on display.

The store is kept just as clean as possible at all times, and the neat appearance gives those visiting the store a good impression. New fixtures when they arrive at the store are taken to the storeroom and there unpacked. The disordered appearance that is given by unpacking a new stock of fixtures is never allowed to mar the store.

The company installs all fixtures purchased at its store. This gives assurance that the job will be done right, and aids in giving satisfaction to customers. The concern also conducts a repair department.

Making Use of All Available Space.

One point that shows how use has been made of every bit of space in the store is the fact that the space under the display windows has been utilized. Drawers were constructed there for storing lamp bulbs and the like. These drawers, while being very handy, also give a neat appearance to the rooms in which they are located. At the present time there are about 300 different types of electric-lighting fixtures on display in the company's showrooms.

The Denver Electrical Company's store is owned and managed by Clark Rider, who has been in the electrical business in Denver for a number of years. His wide experience and business ability are responsible for the success of the establishment. Mr. Rider has built his business up on good, sound merchandising policies. He considers well arranged showrooms essential for the best results and with that idea in mind the present store was conceived. Since the store has been reconstructed business has shown a decided increase, demonstrating that a modern electric-fixture store is a drawing card in itself.

Progressive Electrical Dealer Locates on Principal Business Street.

The A. L. Swanson Company, of Evansville, Ind., (a city of 100,000 population) specializes in the retail end of the electrical business, as well as covering a large territory in the jobbing trade; it also has a fixture department, contact department and electrical machine shop. Growth of the business has caused the company to move to larger quarters in the most prominent shopping district on the principal retail business street of Evansville. The company will be interested in home labor-saving devices, specialties or any article that would be salable in a complete and exclusively electrical store.

The Swanson company is one of the first electrical dealers that is meeting the competition of department, hardware and drug stores, by locating in the high-rent district.

Christmas Advertising Inaugurated in Boston.

A handsome advertising card, for display in street cars and elsewhere, has been issued by the Edison Electric Illuminating Company of Boston, as a reminder that electric appliances for the home are most suitable and acceptable wedding and Christmas gifts. The card is printed in black background, with lettering in white, and the figures are in flesh-colored tints. The ensemble is a striking reproduction of a happy young woman accepting a handsome electric percolator.

The Boston Edison company is holding a special sale of the Thermax electric grill at $4.89, on payment of $1.89 and $1 per month for three months. The regular price is $6.50.

Fixture Selling to House Builders in Greater Boston.

Extensive daily newspaper advertisements, in addition to circularization and salesmen's solicitations, are the means for promoting sales adopted by Farley & MacNeill, jobbers and manufacturers of electric lighting fixtures, Boston, Mass. This concern puts out combination sets of various qualities and prices, and finds a large part of its custom among building contractors, real estate people and private home builders. The salesroom is on the second floor, at 98 Federal Street, the large window spaces being utilized to good advantage with a display of hanging lamps which is readily seen from the opposite sidewalk of the street.

The combinations offered recently range from $14.25 to $65. The lower priced sets consist of a two, three or four-light living-room shower, a three-light shower for dining room, a single pendant hall fixture, kitchen pendant, bedroom wall brackets, bathroom bracket and porch ball. The metal work is brass, in either the old or brush finish, and the glassware is either white or tinted, to match the tint of the room, as desired.

The $65 set offered consists of a crystal cut-glass hall shade, overlaid art-glass shade for the dining room, a four-light cut-glass shower for the living-room, two-light pendants with white alba glass for bedrooms and bathrooms, and pendants with crystal shades for the kitchen and hall. Four bedroom fixtures are furnished in this set.

Special semi-indirect bowls are offered at various prices, a favorite seller being a 16-inch white Grecian bowl, which is offered, wired ready to install, at $3.95.

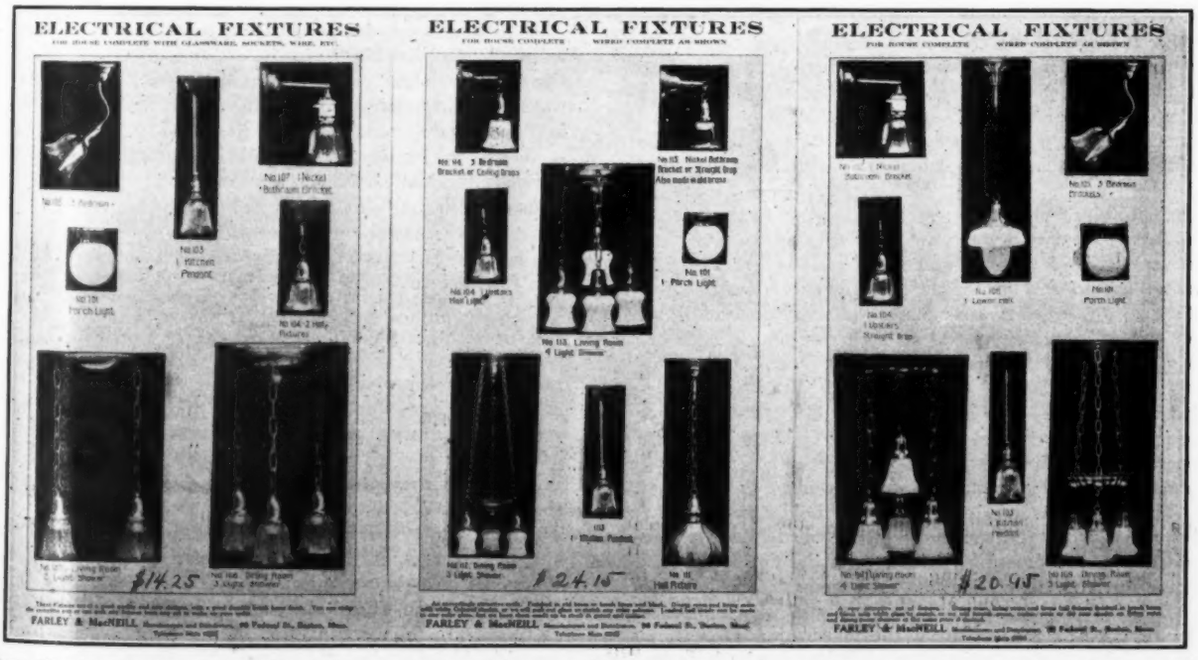
The concern recently installed a complete fixture layout in an apartment house containing 18 eight-room suites, on Naples Road, Brookline. These suites rent for $100 per month. The installation consisted, in each apartment, of an 18-inch alabaster bowl in the front hall, a heavy cast-metal fixture 22 inches in diameter and carrying five lights in the parlor; an overlaid art-glass semi-indirect bowl in the dining room; a four-light shower with Bohemian glassware in the library, three-light showers in the bedrooms, and single combination hangers in the kitchen and back entrance way.

WEDDING GIFT SALE
PORTABLE GAS AND ELECTRIC LAMPS
12-Inch Genuine Cut Glass Lamp.
$6.95
22-Inch Mahogany Lamp and Silk Shade.
$4.95
13-Inch, Beautiful Cut Glass.
$8.75
12-Inch Art Glass Fumed Oak Lamp.
$1.95
16-Inch Overlaid Art Glass, Gas or Electric.
$5.95
20-Inch Cut Glass Lamp.
18.95
22-Inch Cut Glass. A Very Beautiful Lamp.
24.95
Genuine Cut Glass, Overlaid and Leaded Art Glass, Mahogany, Fumed Oak and Silk Lamps.
Please note the few lamps pictured here as an example of our great values for this sale. Hundreds of others to select from. Come early for best selections.
FARLEY & MacNEILL "THE LIVE WIRE FIXTURE HOUSE"
98 FEDERAL STREET

Newspaper Advertisement Published During Campaign Offering Special Low Prices on Portable Lamps.

Another large installation by Farley & MacNeill is in the Jewish synagogue in Roxbury, where the central piece is a single fixture with gold-plated arms, 12 feet by 18 feet, weighing more than half a ton and carrying 72 lights. There are also 188 lights in the arches, five pillar lights and 38 three-light, heavy cast brackets on the walls.

This concern has found that extensive advertising, with special appeals to those desiring combination sets of fixtures, has resulted in greatly increasing its business. Featuring special articles has also secured many sales.



Three Circulars Issued by a Fixture House Illustrating Fixture Combinations Recently Offered in Campaign at Reduced Prices. Sets Were Available at Prices Ranging from $14.25 to $65.

QUESTIONS AND ANSWERS

All readers are invited to submit questions and answers to this department. Anonymous communications will not be considered. Questions should relate to electrical matters of any kind. Answers contributed by readers should be submitted preferably within eight days of the date of publication of the question and should be limited, if possible, to 300 words. Payment will be made for all answers published.

Questions.

No. 372.—Electrolytic Rectifier.—I should like to have given the general specifications of a 100-watt, 110-volt electrolytic rectifier of the carbon and aluminum type.—H. N., Chicago, Ill.

No. 373.—Illumination for Photographing Motion Pictures.—About what intensity of illumination is necessary to take a motion picture successfully in an interior? What kind of lighting is it best to use for this purpose?—J. S. C., St. Paul, Minn.

No. 374.—Relative Efficiency of Belted and Geared Motor Drive.—A 10-horsepower electric motor is to be connected to a machine that is operated at constant speed for many hours a day. Which is the more efficient, belt or spur-gear drive, assuming good attention to be given in each case? There is a speed reduction of 3 to 1 between motor and driven machine.—M. D. P., Sioux City, Iowa.

Answers.

No. 366.—Unloaders for Electrically Driven Air Compressors.—What types of unloaders are available for electrically driven air compressors to prevent severe load fluctuations?—S. E. M., Chicago, Ill.

There may be said to be four types of unloading devices for electrically driven air compressors on the market, which may be classified as follows: (a) those that throttle the air intake, (b) those that by-pass the air discharge, (c) that hold the intake valves open, and (d) those that vary the clearance space of the cylinders.

Unloaders of the first type, namely, that throttle the intake, may be made to either open and close gradually, thus maintaining a supply of air to the compressor which is proportional to the amount of compressed air being used; or to make full stroke on and off instantly. The first arrangement tends for the more constant pressure on the receiver, reduces the likelihood of heavy draughts of current by the motor with their deleterious effect upon the voltage regulation and also may effect a saving in the power bill where current is purchased upon a peak basis. It is, however, the less efficient of the two methods on account of a certain amount of wire-drawing that occurs when the unloader is partly closed during light loads. The second arrangement is the more efficient, since the compressor works at full capacity and highest efficiency with the unloader open, while when the unloader is closed there is practically complete vacuum and the motor has to develop torque only for the friction load. The disadvantage of this arrangement is that the load is thrown on and off suddenly and all at once, resulting in high demand for current and serious fluctuations in voltage.

The second class of unloader, which depends on a by-pass, is really only a half measure, since it does not relieve the compressor of all load because some pressure is required to operate the discharge valves although they be working against atmosphere. This method is rarely used at the present time.

The third type of unloader, which holds the intake valves open, is usually designed so that when the air pressure reaches a predetermined value or unloading point a small valve operates, this valve in turn permitting the influx of air to other apparatus which keeps the inlet valves open either by disconnecting them from their operating mechanisms, as in the case of the Corliss type of valves, or by keeping them off their seats. With the valves off their seats, or open, the air is blown out of the cylinders without opposition, of course, and the load on the motor is that due to friction and windage. This arrangement is very efficient but has the drawback that the load is thrown on and off suddenly.

The fourth type of unloader is the latest to be introduced and finds its greatest application in high-capacity compressor stations. With this unloader a pressure valve controls a series of valves in the cylinder heads of the compressor, these valves in turn discharging into tanks which are really equivalent to a clearance space between cylinder head and piston. Such a clearance results, of course, in a decreased discharge from the cylinders, while the air already compressed and discharged into the tanks enters into the cylinder again on the exhaust stroke, and thereby utilizes part of the energy given it. The result of this is that the efficiency of this unloader is high, and the load on the motor extremely favorable, as regards the demand for current and voltage fluctuations. The arrangement is complicated, and of rather high first cost, for which reasons its use is generally justified only on large, high-capacity compressors.—K. R., Chicago, Ill.

No. 367.—National Electrical Safety Code.—Will the new National Electrical Safety Code bring about the creation of municipal electrical inspection in order to enforce its provisions in those cities where there is now no city inspection?—G. H. F., Rockford, Ill.

The National Electrical Safety Code is a compilation by the Bureau of Standards, Washington, D. C., of regulations that it has felt desirable for general adoption throughout the country in order to bring about such installation and operation of electric circuits and equipment as will insure a much higher degree of safety than now obtains. This Code is not obligatory, but it has been drafted with great care by a federal bureau that has spent several years in investigating the subject from all angles. Consequently it is to be presumed that it will have great weight with state and local governments in drafting or revising laws, ordinances or local electrical codes governing electrical installations within their jurisdictions. It is also a logical assumption that many cities that now have no regulations of this nature nor inspection of electrical work will use the new code as a guide for the enactment of local electrical rules, to enforce which an inspection corps is obviously necessary. As stated above, the matter is entirely up to the local authorities, however. If there is sufficient agitation and demand for local rules and inspections, these will be brought about, regardless of whether the National Electrical Safety Code is used as a guide.

In all likelihood, the principal applications of the new Code will be by the inspectors of state utility and industrial commissions in regulating electrical installations on the public highways, in utility plants and in industrial establishments, that is, in places where special electrical life hazards exist that are not at all covered by the present National Electrical Code promulgated by the National Board of Fire Underwriters.—B. F. H., Riverside, Ill.

No. 368.—Electricity for Sewage Treatment.—Has electricity been used successfully for sewage treatment? In what process is it used most effectively? How much electric power is used per million gallons treated? What portion of the total cost of treatment is the cost of electric power?—R. H. T., Lima, O.

While the electrolytic treatment of sewage has been attempted in various places, the only one with which the writer is conversant is the plant at Elmhurst, New York City. This plant initially was one of 25,000 gallons capacity and was installed as an experiment, but the results were so satisfactory that it has since been enlarged to a capacity of 500,000 gallons per diem. The daily output has, however, frequently averaged 750,000 gallons per day. A very complete description of this installation was given in a paper read at the meeting held in Los Angeles of the American Chemical Society and the American Institute of Chemical Engineers in 1915. A report of this paper will be found in *Metallurgical and Chemical Engineering*, Vol. 13, 1915, pages 735 and 793. This report is very complete and gives a

useful description of the installation and cost of operation. The following information is obtained therefrom:

At the Elmhurst plant the sewage is pumped through the electrolyzation chambers, where it passes between staggered electrodes across which direct current is flowing. From these cells the liquid enters other vessels, where it is admixed with hydrated lime and then passes off to sedimentation tanks. The direct current for the electrolysis is obtained from a motor-generator set consisting of an induction motor driving a direct-current generator with a rating of 125 volts and 40 amperes. Besides this motor-generator set a motor drives a number of paddles for agitaing the sewage as it passes through the electrolytic cells. This is a three-horsepower induction motor. The milk of lime used in the process is made by treating quick lime or hydrated lime with water and this requires a certain amount of agitation from which a one-half-horsepower motor is employed.

The energy consumption for the electrolytic treatment is stated to be 85 kilowatt-hours per million gallons of sewage electrolyzed: that for rotating the paddles 60 kilowatt-hours per million gallons, while 16 kilowatt-hours are required to operate the agitator in the lime vat. A table of operating expenses for a ten-million-gallon plant is given as follows:

Lime, 5 tons at $6.00 per ton	$ 30.00
Electricity for electrolyzation at 2 cents per kilowatt-hour	17.00
Electricity for agitation at 2 cents per kilowatt-hour	14.20
Labor and supervision	30.00
Maintenance and supplies	10.00
Sludge disposal	25.00
Total	$126.20
Cost per million gallons	$ 12.62

The amount of lime per million gallons is stated to be about one-half ton, although it is really less. The cost for lime is therefore about $3.00 per million gallons. (Lime has increased in price since last year.) Labor and supervision also will probably be about $3.00 per million gallons.—I. K., Chicago, Ill.

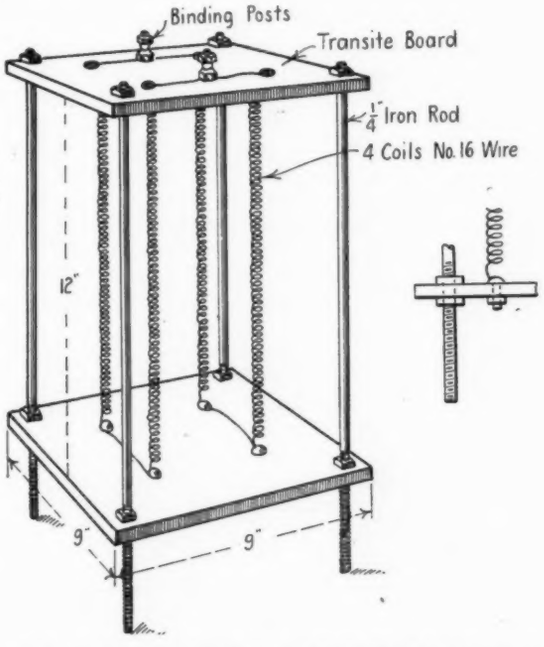
No. 370.—Electric Air Heater.—Will some one kindly give me directions for making an electric air heater that will warm or take the chill from a room 10 by 12 feet? The heater is to operate on 110-volt, 60-cycle, alternating current. I do not care about the looks of the outfit, only the service.—F. M. G., Deferiet, N. Y.

It is first in order to determine the amount of heat required. A frequently used heating and ventilating formula gives for the British thermal units required to heat a room, $H=(W/4+G)T\times c$, where W=outside exposed wall surface, G=window glass surface, both in square feet, T=difference between outside and inside temperatures, and c=correction-factor applied for leakage. Since incomplete data are given, some assumptions will have to be made and, if these are incorrect, the inquirer can modify them to suit the case. Assume that the room is 10 feet high and that two adjacent sides are exposed to the outside; W then=220. Assume two windows of 15 square feet each; then G=30. Assume zero temperature outside and 70 degrees inside; T then=70. If the walls and windows and doors are fairly tight and the door an inside one, the leakage will not be excessive, and c can be taken as 1.2. Then substituting in the formula, $H=(220/4+30)70\times 1.2=7,140$. The British thermal units required per hour to heat the room, with these assumptions, will be 7,140.

The energy of 1 watt-hour=the energy of 3.41 British thermal units. Then the watt-hours required per hour=7,140/3.41 =2,090. Since the watt-hours per hour=watts power, by definition, then the heater will be required to take 2,090 watts from the line. This figure is in accordance with that given in the handbooks for heating a room, 1.5 to 2 watts per cubic foot of contents. 2,090 watts is 1.74 watts per cubic foot.

The next thing then is to design a heater of this capacity. Since the voltage is 110, there will be required a current of 2,090/110=19 amperes. Resistance wire will probably be the best material to use for the heating element. As wire to carry this current would be hard to handle, it will be best to divide the current and use smaller wire. If two parallel paths are used, each one will carry 9.5 amperes. No. 16 will carry this without too high a temperature. Nichrome resistance wire is doubtless the best to use, and No. 16 has a resistance of 0.23 ohm per foot. Then the resistance required to give 9.5 amperes at 110 volts will be 110/9.5=11.6 ohms. The length of wire required for this will be 11.5/0.23=50.5 feet for each of the two parallel circuits. This length of wire can be very nicely wound in two coils each about 12 inches long and 0.75 inch in diameter.

A frame will be necessary to carry these coils. This can be easily built of two sheets of Johns-Manville Transite asbestos wood, each 9 by 9 inches. Cut four 0.25-inch iron rods, 16 inches long, threading them about 0.5 inch on one end and 4 inches on the other. Drill holes large enough to take these rods, one in each corner of the Transite piece. Then, with two nuts at each end of each rod, fasten the rods into the corner holes of the Transite, thus making a frame setting about 4 inches from the floor for the support of the coils. These coils can be fastened to the end pieces of Transite by small stove bolts or binding screws. The two sets of two coils each are connected in parallel, and the ends connected to



No. 370.—Design for Simple Home-Made Electric Air Heater.

binding posts in the top pieces to which the supply wires may be brought. This apparatus, when connected to a 110-volt circuit, should give enough heat to heat the room described.

It may be that a smaller wire, as No. 18, will carry the current, and if so, as it has higher resistance, only 31 feet would be required for each set of coils, or 15 feet 6 inches in each coil. The smaller wire would reach a higher temperature, giving off more heat per foot, but the total heat from the coils made with either size would be the same, as more of the larger wire is used.

A sketch of the apparatus and diagram of connections is shown. The small sketch at the side shows the detail of the method of fastening the corner rods and heating coils. If it is desired to provide for a two or three-heat arrangement, the two coils can be connected to independent binding posts. The two coils could then be connected in series for the lowest heat, either one used independently for medium heat, and connected in parallel as shown for the maximum heat. This heater, while not ornamental, will be found quite serviceable.—F. E. A., Fort Collins, Colo.

BOOK REVIEWS

"First Principles of Electricity." By J. E. Homans. New York: Sully and Kleinteich. Cloth, 248 pages (5x7½ inches), illustrated. Supplied by Electrical Review Publishing Company, Inc., for $1.00.

This is a primer which assumes no previous knowledge of the subject on the part of the reader. The fundamental facts of electrical phenomena are treated without recourse to mathematics and in a simple manner that will be welcome to one who has been discouraged by the involved treatment of other authors. The water analogy is used to some extent, but where the author ventures into an analogy with heat flow the result is more confusing than enlightening. Of the 24 chapters, the first five deal with the more elementary facts. Two chapters are devoted to wires and circuits and two to primary and secondary batteries. Induction is treated in one chapter, magnetism in three, alternating currents in two, polyphase currents in one. The next four chapters deal with direct-current generators and motors. Then follow two on alternating-current motors, one on rotary converters and one on transformers. The last chapter would be improved by an illustration of a commercial transformer and a diagram showing its construction. The chapter on polyphase currents is not well written and gives but a poor conception of this subject, and of what the maximum, average and effective values of a current represent. Otherwise the explanations are usually clear, although the distinctions between work and power, and between reluctance and reluctivity are not made plain. In general the book may be commended to the beginner in this subject, and it has been kept within limits which will appeal to most readers of this class.

"Applied Electricity for Practical Men." By Arthur J. Rowland. New York: McGraw-Hill Book Company, Incorporated. Cloth, 375 pages (5x7¼ inches), over 350 illustrations. Supplied by Electrical Review Publishing Company, Inc., for $2.00.

The author of this book states in the preface that it is intended to fill a need in connection with the study of applied electricity in trade and industrial schools. No doubt it will do that, but it will do a great deal more. There is a wide demand for a book that explains the principles of electricity in connection with its applications, and without the use of mathematics or considerations affecting the design of machinery. This the author has supplied. Fortunately, he has not attempted to make the book completely cover the subject, but has confined his applications to lighting, motors and storage batteries. Electrostatics, electrochemistry, telegraphy, telephony and the rest are ignored, with the result that a book is secured whose size will not discourage the reader, and yet whose contents are sufficiently specific to be useful.

This book is extremely well suited to the study of men engaged in the practical work of the industry, who have not had a technical education, and also to men who have become connected with the business side of the industry with similar lack of preparation. It differs from many other attempts of a similar character by definitely connecting the principles with practical applications. The illustrations are clear and distinctive. Problems at the end of each chapter test the reader's ability to make numerical applications of the information covered. There are in all 18 chapters. Of these, seven are introductory or deal with principles, two deal with direct-current generators, one with direct-current motors, three with alternating-current machines, two with distribution and wiring, one with transformers, one with storage batteries and one with electric lighting.

"Theory and Calculation of Alternating-Current Phenomena." By Charles Proteus Steinmetz. Fifth edition, revised. New York: McGraw-Hill Book Company, Incorporated. Cloth, 480 pages (5¾x9¼ inches), 222 illustrations. Supplied by Electrical Review Publishing Company, Inc., for $4.00.

The wonderful development of alternating-current theory and practice is well typified by this book. Beginning as a paper on the application of complex imaginary quantities to electrical engineering, read before the International Electrical Congress in 1893, it had grown to a volume of 746 pages in the fourth edition, which was published eight years ago, and now the material has developed to such an extent that it is found necessary to divide the work into three volumes, the first of which, under the old title, contains the discussion of the more common and general alternating-current phenomena and apparatus. The two forthcoming volumes will treat of such subjects as "Theory and Calculation of Electric Circuits" and "Theory and Calculation of Electrical Apparatus."

This book contains 34 chapters and an appendix. In the first chapter the author gives a most clear and comprehensive discussion of the correspondence between alternating and direct-current phenomena together with the applications and limitations of Ohm's, Joule's and Kirchhoff's laws. In chapters two and three are discussed the more elementary properties of alternating currents and in chapters four, five, six, and seven are given the mathematical and graphical methods of representation and calculation. The crank diagram and the symbolic method are used.

Section II, consisting of four chapters, treats of electric circuits and phase control. Section III, contains chapters on effective resistance and reactance, eddy currents, dielectric losses, distributed capacity, inductance, resistance and leakage, and power and double-frequency quantities in general. The discussion of alternating-current apparatus begins with Section IV and continues throughout Section V. The first is devoted to induction apparatus while synchronous machines are treated in the latter. Section VI is an excellent exposition of electromotive force and current waves, both as to their properties and effects. Section VII on polyphase systems, their transformation, efficiency and metering energy therein completes the book in so far as it pertains to alternating-current phenomena. The appendix is a chapter on the algebra of complex imaginary quantities.

While the above brief summary may give some idea of the contents of the book, it can give no adequate comprehension of the wealth of material or the scholarly and detailed method of treatment. Whether Dr. Steinmetz has failed to give adequate treatment to certain phases of the subject, one cannot judge without a study of the other three volumes. And this very fact, namely, as stated in the preface, "In the study of electrical-engineering theory, it is recommended to read first Part I of 'Theoretical Elements of Electrical Engineering' then the first three sections of 'Alternating Current Phenomena,' etc." militates against the use of this book as a text. It is extremely inconvenient to use four or five texts at the same time. For graduate work and for reference the book is invaluable. Dr. Steinmetz's comprehensive grasp of alternating-current phenomena is in itself an inspirational phneomenon. Many authors have tried to use the symbolic method in the exposition of alternating-current theory, but it usually is very evident that they are unskilled in the use of this tool. Dr. Steinmetz, however, wields the tool with such expertness and precision that the results show the workmanship of a master. When the International Jury of Awards of the Panama-Pacific International Exposition voted to award the grand prize to Dr. Steinmetz for his "pre-eminent achievement in the field of applied science," it gave due consideration to his contributions to electrical-engineering theory and practice.

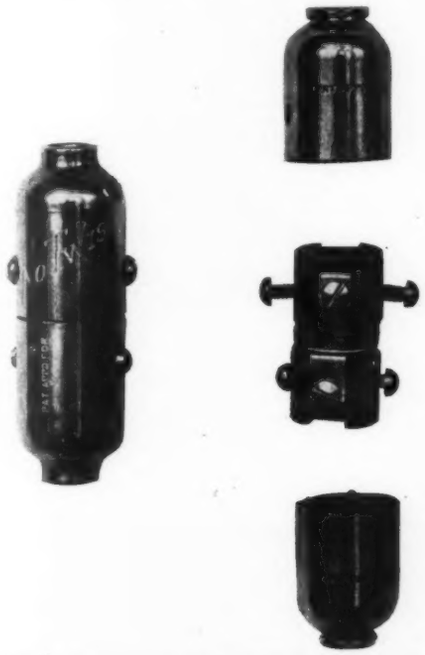
C. M. Jansky.

NEW APPLIANCES

A Weekly Review of the Latest Developments and Current Information Respecting Electrical and Kindred Mechanical Appliances

Swiveling Attachment for Flexible Cords to Avoid Twisting.

A troublesome feature connected with the use of all flexible extension cords, whether used for telephones, portable lamps, tools, flatirons, or other electrical appliances, is the liability of the cord to become tangled. This is not



Assembled and Disassembled Views of "No-Twist" Swiveling Attachment.

only an annoyance, but one of the chief causes of cord short-circuiting, due to the continued bending and straining of the cord covering and insulation.

To overcome this difficulty there has been placed on the market a patented swivel device that can be readily inserted into any ordinary telephone or other electrical extension cord. It consists of two small composition parts turning on a central spindle, all inclosed in two small brass shells or covers. Between the two rotating parts are two ball races that serve both as frictionless bearings and as conducting means. The cord terminals are easily connected to the binding screws on each part and there is ample room for a strain knot within each shell. The shells are securely fastened to each internal part by means of screws. When connected, with the covers in place, smooth outer surfaces are exposed which prevent any likelihood of this attachment catching into anything it may come in contact with. Consequently the two halves of the swivel can easily turn without obstruction. This freedom of swiveling relieves the tendency of the cord to become snarled.

This "No-Twist" swivel has been approved by the Underwriters' Laboratories. It is rated at 660 watts, 125 volts, thus making it serviceable in the cord for almost any portable appliances, such as curling irons, flatirons, extension lamps, etc., with all of which cord troubles frequently occur on account of excessive twisting.

A modified form of the Bacon "No-Twist" swivel device and resembling it closely is the combination swivel and switch. In this case one part of the swiveling connector includes a compact push-button switch, which is particularly convenient in connection with the use of smaller portable appliances.

The Bacon "No-Twist" swivel connector is made by the No-Twist Swivel Manufacturing Company, Oakland and San Diego, Cal.

An Improved Electric Heating Pad.

The marked superiority of the electric heating pad over the old-fashioned hot-water bottle for relieving practically all sorts of pains has led to its deserved popularity as a necessary adjunct of the home and hospital. Of the numerous electric pads now on the market an improved form of the Sun-Ray pad is now available. The original form was described in our issue of March 6, 1915. It was popular right from the start and a large number of them are in use, giving entire satisfaction.

The illustration shows the newer Sun-Ray pad, which is 12 by 15 inches in size. It is provided with either a single heat or three heats. The latter is in more general demand. This triple-heat arrangement is obtained by using two heating elements, one of 20 and the other of 35 watts; each has a separate button on the feed-through switch in the cord; by pressing both the white buttons both of the elements are con-

"Sun-Ray" Three-Heat Electric Heating Pad.

nected, consuming 55 watts and giving the high heat. Each element has a separate thermostatic cutout of compact but reliable construction, which cuts off the current when the temperature reaches 180 degrees Fahrenheit, thus eliminating all danger of excess heat.

These pads are well made in every particular and are guaranteed by the makers. The heating coils are arranged spirally and are unusually flexible. The coils are thoroughly insulated. A soft eiderdown covering is used on the outside.

These pads are made by the Sun-Ray Manufacturing Company, Oshkosh, Wis. A. Hall Berry, 97 Warren Street, New York City, is the eastern sales representative of the company.

Peters Electric Pumping Equipments.

In small towns that do not possess municipal or corporate water supply and also on farms and country estates it is becoming more and more necessary to install private pumping plants, since hand pumping like other arduous labor is fast giving way to power-driven machinery. Such a pumping plant also permits piping the water to modern, sanitary plumbing fixtures throughout the premises, thus providing one of the important features of city life.

Of the various methods of power pumping for this kind of service, electric pumping has many advantages, such as ease of control, cleanliness, noiselessness, simplicity, etc. A large number of electric pumping equipments for this purpose are available, of which the ones described in this article are typical of the most reliable and economical makes.

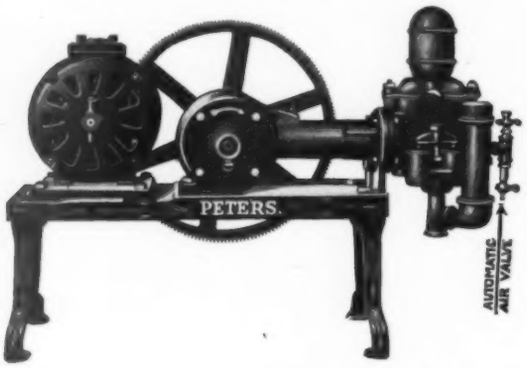


Fig. 1.—Electric Geared House Force Pump.

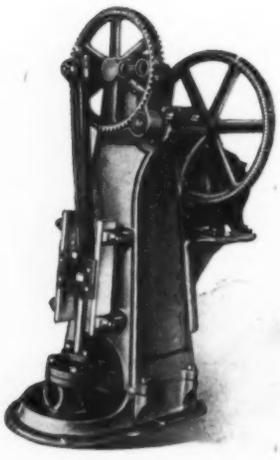


Fig. 2.—Electric Back-Geared Working Head.

Fig. 1 shows an electric house force pump of simple and rugged design that possesses a unique gear drive, including a machine-cut master gear and a Fabroil pinion on the motor: this pinion is made of specially prepared compressed cloth, which is quiet-running and is said to be much more durable than metal or rawhide. This gear drive is more economical than belt drive. The double-acting pump has a 1.25 by 3-inch brass-lined cylinder with rubber-faced brass poppet valves and brass piston. This outfit has ample capacity for pumping 190 gallons per hour and is suitable for 75-pound pressure or 150-foot elevation. It is provided with an automatic double-pole switch that comes set to cut in at 20 pounds and to cut out at 45 pounds pressure; other adjustments can easily be made for pressures up to 85 pounds per square inch and covering a working range of about 45 pounds. This switch adapts the outfit to automatic water systems. The motor furnished with the outfit is one-third horsepower and is either 60-cycle, single-phase 110 or 220 volts, or direct-current 110 or 220 volts,

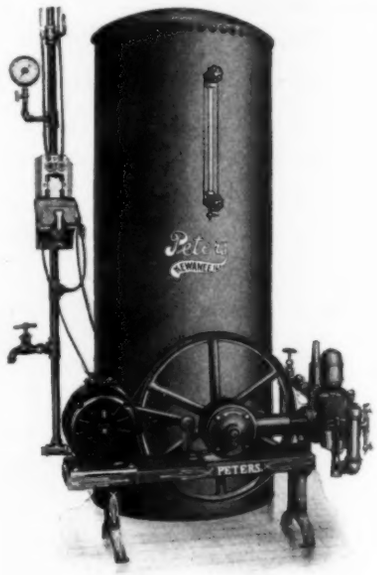


Fig. 3.—Electric Automatic Water System with Vertical Tank.

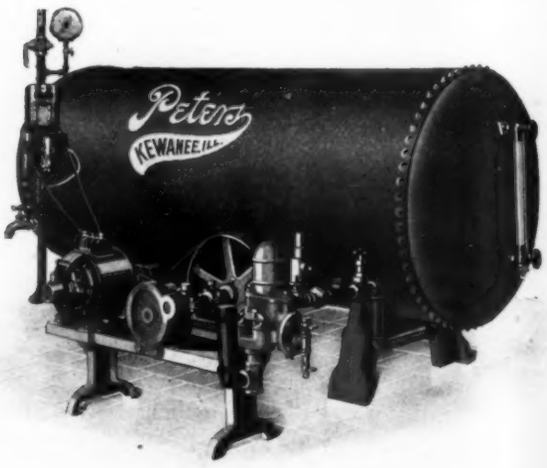


Fig. 4.—Automatic Water System with Horizontal Tank.

or direct-current 30 or 60 volts if used with country lighting plants. In each case one of the best motors on the market is used.

A compact electric working head is shown in Fig. 2. This is a back-geared pump with speed reduction of 6 to 1. It is especially adapted for use with the deeper wells up to 400 feet, although also suitable for shallow wells. The piston is brass-covered and 1.125 inch in diameter; the stroke can be adjusted to 5, 7.5 or 10 inches. This outfit can be provided with a motor of such size as to meet the requirements; four sizes of motors from 0.75 to 2 horsepower and of various standard voltages, direct or alternating current, are obtainable for this purpose. When used with an automatic water system, this

working head is usually provided with an air-compressor attachment and automatic controller or switch. Every detail of the design of this set has been worked out with the idea of making a very strong and reliable outfit.

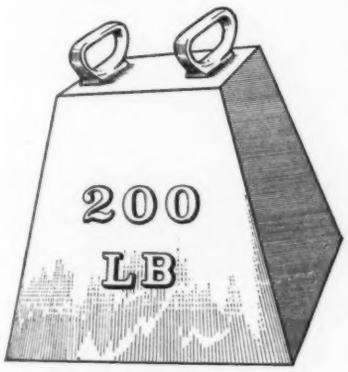
A complete automatic water system is shown in Fig. 3. It is adapted for use with cisterns or wells up to 22 feet suction. A one-third-horsepower motor is belted to a pump similar to that shown in Fig. 1. A standard pneumatic tank is furnished in any of four sizes ranging from a working capacity of 90 to 220 gallons. The automatic two-pole switch can be seen mounted on the vertical pipe to the left of and above the motor. This outfit can also be provided with an electrically welded, galvanized tank.

In Fig. 4 is shown a somewhat larger outfit with horizontal tank. It has a one-half-horsepower high-duty motor, which in the case of the alternating-current motor is of the repulsion-starting induction type. The pump has a capacity of 375 gallons per hour. Five different sizes of tanks can be provided with this set, ranging from working capacities of 180 to 385 gallons. Automatic control is provided by the automatic switch shown above and to the left of the motor.

The electric pumping outfits briefly described and illustrated are typical of the extensive line manufactured by the Peters Pump Company, Kewanee, Ill. Other power-driven and hand pumps are also made by this company.

Mirth-Provoking Electrified Weights.

It is customary when initiating candidates for membership in secret fraternities, clubs and similar organizations to relieve the solemnity of the occasion by some innocent fun-producing features. An electric chair, which suddenly



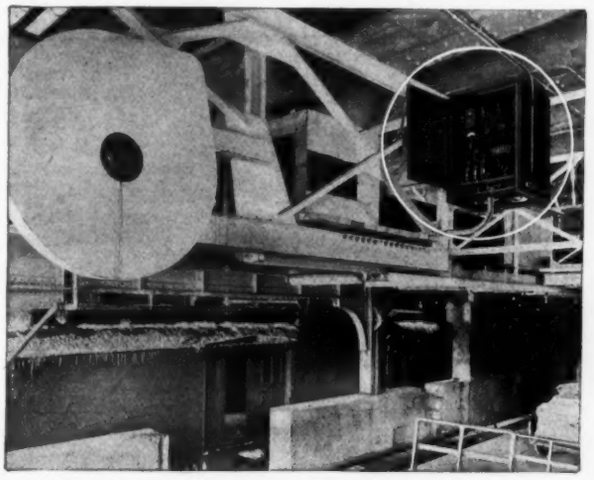
Innocent-Looking Electrified Weight.

enlivens the person who attempts to sit upon it, was described in these columns in the issue of February 13, 1915. The inventor and manufacturer of these chairs, John J. Odenwald, 1204 H Street, N. W., Washington, D. C., has now brought out a new electric initiation "stunt."

As shown in the accompanying illustration, this is an innocent device which, on account of its special appropriateness in an affair of this kind for testing the qualities of all candidates, makes the latter unsuspicious of anything but a test of physical strength. The weight is not made of wood, nor is it an apparent "fake"; its actual weight is 40 pounds. The unique feature of the device is that when the candidate actually lifts the weight he finds it to possess decided electrical properties as well as considerable gravitational mass. The source of these mysterious electrical effects is kept a secret by Mr. Odenwald, although presumably it somehow must be contained within the body of the weight. There are no visible wires and the outfit is entirely self-contained. It can be furnished at a price of $15, f. o. b. Washington, D. C., on application to Mr. Odenwald, who is one of the wide-awake electrical contractors of the capital city.

Push-Button Control of Motor-Driven Conveyor Systems.

Motor-driven conveyors are now used for handling many articles and products in factories of all kinds. For the large quantities of mail received at important terminals conveyor



Controller with Remote-Control Push Buttons for Motor-Driven Mail Conveyor.

systems have also been found to provide the speed required. In the mail building of one of the largest railroads, the conveyor system has been worked out to provide especially flexible and efficient handling. This equipment consists of two 800-foot conveyor belts, one of 30-inch and the other 36-inch width, and a 200-ton-per-hour vertical conveyor or bucket lift.

These conveyors are driven by motors equipped with the new magnetic lockout-switch speed-setting controllers made by the Cutler-Hammer Manufacturing Company, Milwaukee, Wis. One of these is of 15-horsepower capacity, used with the 30-inch conveyor, and the other is 35-horsepower, used with the motor of this capacity driving the 36-inch conveyor and the bucket lift. The controller has a speed-setting arrangement, so that the speed of operating the conveyors can be varied to suit the requirements. Push-button stations, similar to the one shown in the upper left-hand corner of the control panel, are located at various points along the platforms, so that the starting and stopping can be controlled from any of these remote locations.

Repairing Chipped Rolls by Arc Welding.

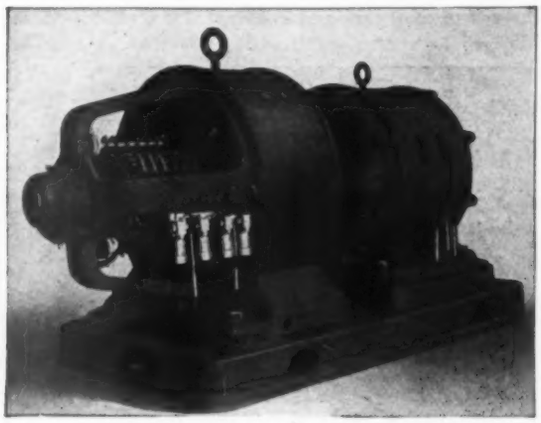
The field for the application of electric arc welding is an extremely broad one. Practically every industry making use of

Chipped Roll Repaired by Arc Welding.

iron and steel can utilize the electric arc welding process to distinct advantage. In foundries and machine shops many ap-

plications for arc welding are being found. Steel mills also use this method with great success.

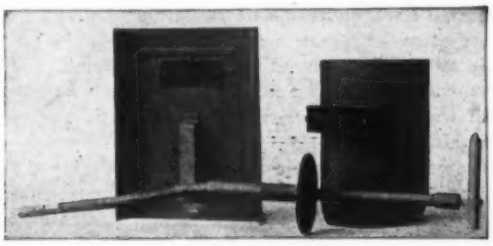
The illustration on page 943 shows a roll used for turning out special shapes of sheet piling. It has been repaired by



Motor-Generator Set Used for Arc Welding.

electric arc welding. The extent of the weld is indicated by the arrows, the points of which touch the periphery of the weld.

Rolls occasionally chip out. Instead of scrapping the roll or turning it down, one of the large steel companies has found that very great economies can be effected by repairing the de-



Protecting Hoods and Electrode for Arc Welding.

fective spot by means of the electric arc. The chipped portion is first filled in and welded; after which it is ground or filed to the proper shape. After the work has been completed, it is practically impossible to detect the point at which the weld has been made except by very close examination. The repairs are apparently permanent and will wear as long as any other part of the roll.

The steel company in question is making all its repairs of this nature by means of the electric arc, employing electric welding sets made by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. The company is also securing very successful results in repairing worn wobblers, and rebuilding broken teeth in gears and pinions in the same manner.

One of the motor-generator welding sets used for this work is shown in the above illustration. The second illustration shows two typical shields used to protect the face and particularly the eyes of the welding operator; one of the protected electrodes is also shown.

Flood Lighting of Railroad Yards.

The use of the flood light in railroad yards at night is a big stride toward the goal of safe working conditions. The accompanying illustrations show the appearance of a terminal illuminated with Western Electric-Davis flood lamps, and convey a good idea of the detail with which the track, frogs, switches, etc., are brought out, which is remarkable, in view of the small number of lamps used.

It will be noted that the projector lamps do not throw out a defined and concentrated beam, but rather tend to spread the light uniformly over the section on which they are directed. The tall pole in the foreground of the first illustration is 60 feet in height, and the fact that the top is clearly visible illustrates the advantage of the light bath,

General View of Flood-Lighted Railroad Yard.

with its soft, even illumination, as opposed to the searchlight, with its sharply defined illuminated zone and very decided blinding effect.

Flood Lighting Near Locomotive Round House.

When this system was demonstrated at the recent convention of the American Electric Railway Association, at Atlantic City, the railroad men were enthusiastic in their

Flood Lighting of Important Switches.

praise of its virtues, and the feeling was prevalent that the flood lamp will be a necessary part of the equipment of the railroad of the future.

INDUSTRY ACTIVITIES

Campbell Electric Company, Lynn, Mass., has issued a new catalog of its electric time-switches.

Humbird Lumber Company, dealer in Western cedar poles, announces the removal of its Minneapolis offices from 1028 Lumber Exchange to 926 McKnight Building.

Charles G. Atkins, consulting electrical engineer, has removed his office from Room 1343 to Room 1457, Monadnock Block, Chicago, Ill.

Leeds & Northrup Company, Philadelphia, Pa., manufacturer of electrical instruments, will build a new five-story reinforced-concrete factory on Stenton Avenue, to cost about $120,000.

The Roessler & Hasslacher Chemical Company, 100 William Street, New York City, has issued bulletin No. 330, its revised price list of chemicals manufactured by the company.

Stone & Webster Engineering Corporation, Boston, Mass., has issued a 64-page booklet containing numerous illustrations of industrial plants, power stations, office and educational buildings and warehouses constructed by this concern.

Westinghouse Electric & Manufacturing Company, Westinghouse Lamp Company and R. B. Nuttall Company announce the removal of their San Francisco offices to the seventh floor of the First National Bank Building, 1 Montgomery Street.

The Electric Porcelain & Manufacturing Company, Trenton, N. J., manufacturer of electric porcelain specialties, has acquired a new plant on New York Avenue, and will remove its present factory to the site. Plans are being prepared for a large addition on Olden Avenue, to cost about $70,000.

Edison Lamp Works of General Electric Company, Harrison, N. J., devotes the major part of the November issue of the *Edison Sales Builder* to suggestions for dealer participation in America's Electrical Week. Blank orders for publicity material are included in the issue, so dealers may obtain sales helps with as little inconvenience as possible.

The Electric Cable Company, 10 East Forty-third Street, New York City, announces the opening of its Chicago warehouse with a complete line of "Ecco" insulated wires and cables, and is now prepared to make prompt shipments of all sizes from this point. Quality and service are considered as essentials by this company, whose endeavor is to always furnish both.

The Van Dorn & Dutton Company, Cleveland, O., has prepared a 40-page booklet entitled "Facts About Gears," in which are given tabulated data on gearing terms, drawings and specification formulas for every type of gearing. Numerous engineering tables are included. As a digest of specialized gear data the booklet is worthy of a place in every gear user's reference library. Copies may be had upon application to the company.

The Chesapeake Electric Company recently filed incorporation papers as manufacturers' representative and jobber of general electrical merchandise, and has opened a salesroom and office at 205 North Calvert Street, Baltimore, Md. The company has adopted as its slogan, "Service First," and is prepared to render this service in the nature of general engineering information to the trade and in the matter of prompt shipments. The company has been capitalized at $25,000.

Doehler Die Casting Company has let a contract for the construction of an addition to its factory at Court and Ninth Streets, Brooklyn, N. Y. The addition will be seven stories, 50 by 100 feet, and will cost approximately $150,000.

American Electrical Works, Phillipsdale, R. I., manufacturer of bare and insulated wire and cables, galvanized iron wire and strands, and power and telephone cables, has issued a new price list, effective November 11, of its products.

Menominee Electric Manufacturing Company, Menominee, Mich., manufacturer of fractional-horsepower motors, fan motors, telephones, intercommunicating systems and other electrical devices, has issued a general bulletin on its products.

The Sherwin-Williams Company, manufacturer of insulating and other paints, celebrated the fiftieth anniversary of its organization in Cleveland, O., November 13-16. Officials, managers, representatives and factory employees from the company's offices throughout the world gathered to participate in the golden jubilee.

Roller-Smith Company, 233 Broadway, New York City, has issued Bulletin No. 207 on a portable storage-battery equipment for use with the Roller-Smith bond-tester. The particular application of this apparatus is to provide an external source of energy for testing rail bonds in case the current in the rail circuit is insufficient.

The Valentine-Clark Company, Minneapolis, Minn., announces that the fire at its Minnesota Transfer yard on November 6 consumed only a part of its stock of cedar poles. Surplus stocks from nearby shipping points were drawn on to complete the stock of Northern red-cedar poles, enabling the company to ship all sizes as promptly as ever. The large stock of Western red-cedar poles was untouched by the fire, as well as the company's treating plant, buildings, track and other facilities at the Minnesota Transfer. The company was able to avoid delays in its deliveries to all customers.

Electrical Show at Trenton.—The following companies have taken space at the electrical show to be held at the Masonic Temple, Trenton, N. J., December 1-5, under the direction of the Trenton Electrical Club: Public Service Electric Company, John A. Roebling's Sons Company, Trenton Electrical Supply Company, Pyroelectric Instrument Company, J. L. Mott Iron Works, Franz Premier Company, Hoover Suction Cleaner Company, Star Porcelain Company, Globe Porcelain Company, National Porcelain Company, Imperial Porcelain Company, Union Porcelain Company, United & Globe Rubber Manufacturing Company, Home Rubber Company, Thermoid Rubber Company, Joseph Stokes Rubber Company and Hamilton Rubber Company. The local Chamber of Commerce and Engineers' Club are co-operating with the Electrical Club in making the show a success.

Hurley Machine Company, 29 South Clinton Street, Chicago, and 147 West Forty-second Street, New York City, has issued catalog C, on its lines of electric washing machines, vacuum cleaners and ironing machines. The catalog points out the convenience of electric washers, the high class of work done by the "Thor," its ease of operation, durability, safety, utility and construction features. The latter include the "atalog," a device connected to the main drive shaft which prevents injury to the operator or the machine. The different styles, from the Junior for

small families to the No. 36 for heavy service, are illustrated, described and priced. "Thor" ironing machines and vacuum cleaners are included in the catalog, their construction and utility being fully described. The company's gurantee and easy payment plans are also outlined. For the use of dealers, the Hurley company has prepared a number of booklets for distribution to prospective purchasers. These give the important features of "Thor" machines.

Westinghouse Electric Christmas Campaign.—For the purpose of stimulating the sale of electric appliances by central stations and dealers during the Christmas season, the Westinghouse Electric & Manufacturing Company has prepared and distributed quite an elaborate campaign which possesses some unusually attractive features which will prove of assistance in aiding the sales of electrical devices. The idea embodied in the preparation of the literature has been to afford the central stations and dealers all possible assistance and offering suggestions enabling them to convince the prospective user of the usefulness and attractiveness of electrical appliances as Christmas gifts. The announcement and outline of the campaign is accompanied by a sample of the folder to be mailed to the customer, and a post card requisition for the various campaign helps enumerated therein. The announcement contains reproductions of full-page advertisements in the popular magazines, reproductions of newspaper advertisements, window cards, lantern slides, car cards, window displays and a display stand for appliances. The folder for mailing is neatly printed in holiday colors having space left for the imprint of the central station or dealer, followed by a letter embodying the Christmas spirit, with a suggestion of the adaptability of electrical appliances as holiday gifts. On the inside pages are shown various devices with the prices of each, while on the back page is given a memorandum blank for gifts and the name of the recipient. All that the dealer has to do is to fill out the post card for as many of these helps as he desires, mail it to the company, and the helps will be promptly forwarded.

PERSONAL AND BIOGRAPHICAL

MR. HENRY F. HOLLAND has been appointed manager of the electric range department of the Great Western Power Company, with offices and display rooms at 511 Sutter Street, San Francisco, Cal. Mr. Holland is one of the best informed men in the country with regard to every department of electric heating and cooking.

H. F. Holland.

He was for many years in charge of the Chicago office of the Pacific Electric Heating Company, and for the past seven years was special representative of the Simplex Electric Heating Company, Cambridge, Mass. Leaving Chicago about six years ago, he spent a couple of years in Denver, Colo., then maintained headquarters at Salt Lake City, Utah, and for the last two years has devoted most of his time to Pacific Coast cities, with headquarters in Los Angeles, Cal. He was a prominent member of the Electric Club of Chicago, is a Jovian of long standing and has had a conspicuous connection with Jovian affairs in all parts of the country. He was the first Tribune for Southern California and last year was president of the Jovian League in Los Angeles. Mr. Holland's new appointment is a well deserved recognition of long and faithful service, and he will prove to be a tower of strength in his new connection.

MR. ROBERT P. PARROTT, of the General Electric Company, spoke on "Electrical Conditions in Japan" before the members of the Trenton Engineers' Club, Trenton, N. J., on November 16.

MR. RICHARD S. COX, of the Philadelphia (Pa.) Textile School, gave an interesting address on "Color and Its Relation to Textiles" before the members of the Illuminating Engineers' Society, Engineers' Club, New York City, on November 17.

MR. F. B. GLEASON, formerly in charge of the Western Electric Company's business in the Far East, with headquarters at Tokio, Japan, has been appointed manager of the southern district of the Western Electric Company, with headquarters at Atlanta, Ga. He will succeed Mr. E. J. WALLIS, who, on January 1, will take up his new work as manager of the Pacific Coast district, with headquarters at San Francisco. Mr. Wallis will succeed MR. F. H. LEGGETT, who, after three years on the coast, returns to the company's executive offices at 195 Broadway, New York City.

MR. ERNEST JACOBS, prominent in electrical engineering circles, has accepted the position of chief engineer with the Electrical Engineers' Equipment Company, of Chicago, Ill. Mr. Jacobs has been with the General Electric Company at Schenectady continuously since 1900 and was at the time of his resignation chief designing engineer in the switchboard department. During his connection with the General Electric Company, Mr. Jacobs conducted engineering investigations of practically every big power project in this country and his wide experience peculiarly fits him for his new duties. He graduated from the University of Michigan in 1900 and is prominent in many engineering and scientific bodies.

MR. L. O. GORDON, who, as announced in last week's issue, has been promoted from manager of the Valparaiso (Ind.) Lighting Company to manager of the Jackson (Miss.) Light & Traction Company, began his electrical career in 1902, when he became connected with the power and mining department of the General Electric Company in its

L. O. Gordon.

Chicago offices. In 1906 he was transferred to the company's Schenectady plant, and after spending a year there was transferred to the Minneapolis office, where he specialized on motor sales. In 1912 he severed his connection with the General Electric Company to become manager of the Valparaiso Lighting Company. During his stay in Valparaiso Mr. Gordon was instrumental in making many improvements to the electric service and extensions and improvements to the street-lighting system. He identified himself in a large way with civic activities and was a director in the Chamber of Commerce. Mr. Gordon's new position in Jackson carries with it the management of the electric plant, street railway system and gas plant.

MR. E. W. RICE, JR., president of the General Electric Company, in speaking before the National Founders' Association in New York City last week, stated that a unity of industrial interests in America would be necessary in the commercial war that probably would ensue following the close of the European conflict. He also declared that manufacturers must sharpen their wits to meet competition, and that proper industrial effort should be supported by governmental agencies.

MR. A. B. COWAN, district commercial superintendent of the Western Union Telegraph Company in charge of Illinois and Iowa, has been appointed general manager of the mountain division, comprising eight states, with headquarters at Denver. The new appointment will be effective December 1. Mr. Cowan will succeed MR. W. J. LLOYD, formerly of Chicago, who asked to be retired after 51 years of service. For the last 22 years Mr. Cowan has held various positions with the Western Union at Chicago and for six years has been district commercial superintendent in charge of the two states.

MR. H. A. JOSLIN has been appointed local manager of the Oregon Power Company at Eugene, Ore.

MR. WILLIAM L. KEPLINGER has resigned as manager of the Newton Electric & Gas Company, Newton, N. J.

MR. J. G. PERTSCH has been promoted from assistant professor to professor of electrical engineering at Cornell University.

MR. SAMUEL M. HEFFNER, of Providence, R. I., has assumed his new duties as manager of the Meredith (N. H.) Electric Light Company. He has lately been engaged in construction work in San Domingo, West Indies.

MR. A. E. BETTIS, for the past 13 years connected with the Kansas City Light & Power Company, has been made superintendent of engineering and construction, and is in charge of all the company's plants and lines. Mr. Bettis incidentally handles practically all of the engineering and operating work of the Kansas City Heating Company, which is connected with the former company.

MR. W. L. MILLER, manager of the Interstate Light & Power Company, Galena, Ill., a Northern States Power Company subsidiary, has been elected secretary of the Good Roads Club, an organization of Galena citizens subscribing to the improvement and maintenance of good roads in the Galena district.

MR. M. LUCKIESH, of Nela Research Laboratory, National Lamp Works, Nela Park, Cleveland, will deliver a paper before the Illinois Society of Architects and the students in architecture of the University of Illinois, at the Art Institute, Chicago, Ill., November 28. The subject will be "Light, Shade and Color in Architecture." Mr. Luckiesh is widely recognized as an authority on the subject covered by his paper. He is a pioneer in the study of the relation of light, shade and color in lighting, and is the originator of many new ideas on these subjects. He has recently completed two books, "Color and Its Application," "Light and Shade and Their Application," in which are presented the basic principles of the author's theories.

OBITUARY.

MR. CARLETON SPRAGUE, secretary of the Western Union Telegraph Company, died November 19 at his home in New York City, in his fifty-ninth year. He was born in Buffalo and graduated from Harvard University in 1881. He was connected with the Western Union company for many years.

MR. A. C. EINSTEIN, vice-president and general manager of the Union Electric Light & Power Company, St. Louis, Mo., was stricken with heart disease and died at his home in that

A. C. Einstein.

city November 20. He attended a dinner party at the Columbian Club the evening of November 19 and was stricken upon his return home. He was in the best of spirits and apparent good health both in the evening and earlier in the day. Mr. Einstein was born in Hoboken, N. J., in 1869, and was educated in the schools of St. Louis, studying at Washington University several years. In 1890 he became president of the Consolidated Engineering Company, which constructed electric power plants. Later he purchased an interest in the Paducah (Ky.) Electric Light & Street Railway Company and became president, but sold his stock to purchase the Suburban Electric Light & Power Company, of St. Louis, in 1896. After acquiring this property he organized the St. Louis Gas Company. Two years after disposing of the Suburban company, in 1904 he purchased the King Electric Light & Power Company, which was later merged with the Suburban company. In 1912 he was appointed vice-president and general manager of the Union Electric Light & Power Company. The field of lighting service in St. Louis and suburbs was very familiar to Mr. Einstein and he was particularly successful in extending and popularizing his company's business. St. Louis Jovians held a special meeting November 21, at which resolutions of condolence were presented. Mayor Kiel spoke of Mr. Einstein's business relations with the city, and Richard McCullough, president of the United Railways Company, dwelt on Mr. Einstein's personal qualifications which had done much to advance the interests of his company. The funeral was held Wednesday, over 200 Jovians attending in a body. Mr. Einstein leaves a widow, son and daughter.

MR. JOHN A. BARRETT, who passed away at his home in Maplewood, N. J., on November 9, ranked high among the engineers of the Bell System who by their studies and inventions have advanced the art of telephony and have made universal telephone service a reality. He was born in Woodstock, Vt., in 1858. He attended Middlebury College, but owing to impaired eyesight and general ill-health, was unable to complete his college education. In 1882 Mr. Barrett entered the service of the Western Electric Company, and assisted in the development of the Patterson cable and the improvement of the chloride-of-silver battery. In 1884 he severed his connection with the Western Electric Company and with his brother formed the partnership of Barrett Brothers, of New York City. He also became associated with the Okonite Company, assisting in the development of that business. A Faradic and a Galvanic battery, both of which are still in use, were fruits of Mr. Barrett's work during this period. In 1886 he was employed to study the cross-talk problems on the New York and Philadelphia line, which had been completed by the American Telephone & Telegraph Company in 1885. While working out this problem, Mr. Barrett invented the transposition system now in general use. When, in 1888, the New York & New Jersey Telephone Company began the manufacture of underground cable, Mr. Barrett became associated with that work and was the first to use paper insulated wire and continuous cable sheath. He was also one of the inventors of an electric motor, the feature of which was a "laminated field." Later he formed a manufacturing company known as the Elektron Company and became its president. In 1890 he constructed one of the first storage-battery automobiles. In 1893 this company having consolidated with another, he retired

J. A. Barrett.

from active management and re-entered the service of the American Telephone & Telegraph Company. Since that time Mr. Barrett has been in active service in the engineering department and during his 23 years of service his work has covered many branches of telephone engineering, including selective bells and power and light interference with telephone circuits. In recent years he has been handling engineering work and working out technical problems in legal cases. Mr. Barrett was a member of the Telephone Pioneers of America, an honorary member of the New York Telephone Society and a member of the American Institute of Electrical Engineers. He is survived by his widow and three daughters.

CURRENT ELECTRICAL NEWS

Weekly Record of Construction Activities

EASTERN STATES.

MILO, ME.—The Lake View Electric Company has been incorporated in this city for the purpose of generating electricity for lighting, heating and power purposes in Lake View and Brownville. The company is capitalized at $5,000 and E. M. Hamlin is president.

DOVER, N. H.—The Twin State Gas & Electric Company is building a two-story transformer house on the Indigo Hill road. Apparatus will be located on the first floor, while the second story will be furnished as a tenement for the operator. This is an innovation in central station practice, but is likely to be a desirable feature.

BARNARD, VT.—The Gaysville Electric Light & Power Company will construct a transmission line to this village to supply street lighting and commercial service to about 20 farmers along the route.

LEOMINSTER, MASS.—A committee of the City Council has been appointed to investigate the gas and electric service.

NORTH ADAMS, MASS.—The City Council has appropriated funds for a new street-lighting system, work on which will be commenced at once.

NORWOOD, MASS.—The Selectmen have granted a joint petition of the Norwood Electric Light Department, the New England Telephone & Telegraph Company and the Norwood, Canton & Sharon Street Railway Company for the right to erect a new pole line to be used jointly by the companies in this city.

SPENCER, MASS.—The burning out of transformers in the plant of the Spencer Gas Company caused temporary suspension of service November 13. A desire that the company have an emergency plant, or breakdown connection with another system, may lead to means whereby a repetition of the trouble will be provided against.

WESTFORD, MASS.—Citizens here have voted for the approval of a new five-year contract with the Lowell Electric Light Company for 185 lamps.

EAST HARTFORD, CONN.—The Hartford Electric Light Company has submitted a proposition to the Board of Commissioners for extending the local street-lighting system.

SEYMOUR, CONN.—The United Electric Light & Water Company and the Seymour Electric Light Company, its subsidiary, are about to install a number of power lines which will be ready to operate early in the spring. The power load in Naugatuck and Seymour has grown from about 500 horsepower in September, 1914, to over 3,000 horsepower, and it is expected to run over 3,500 horsepower by next April.

WATERBURY, CONN.—A power house will be built for the A. H. Wells Company. C. H. Preston, Jr., is the architect.

PROVIDENCE, R. I.—The Rhode Island Company will award contracts soon for new substations at Harmony and Oakland, most of the equipment for which has been purchased.

AKRON, N. Y.—Extensive repairs are to be made to the plant of the American Gypsum Company. Electric power for the entire plant will be installed, according to Superintendent Soengler.

LITTLE FALLS, N. Y.—The City Council is considering a new five-year contract with the Utica Gas & Electric Company for furnishing energy for street lighting. The utility company proposes to replace the present arc lamps with gas-filled units.

NIAGARA FALLS, N. Y.—Officials of the Niagara Falls Power Company have announced that the plans under which the company will expend upwards $11,000,000 for the building and extending its plant at Niagara Falls have been prepared and ready for execution. When the plans are carried out the capacity of the plant will be over 180,000 horsepower, double that of its present capacity. The present demand for power in this vicinity is so great that numerous industrial plant extensions are curtailed because the power companies are unable to supply more energy at the present time.

OSWEGO, N. Y. — The Stuart-Hartshorne, of Newark, N. J., which recently acquired a factory site here, is making preparations for building a large power plant for operation of its factory machinery.

OSWEGO, N. Y.—The Public Service Commission has approved the extension of the franchise of the Peoples Gas & Electric Company of this city through the town of Sterling and the village of Fair Haven, a distance of about nine miles. A transmission line probably will be erected next year.

BAYONNE, N. J.—An ornamental street-lighting system is being installed on Broadway, comprising 48 specially constructed lamps. It is planned to formally open the system on December 11. The Public Service Electric Company is making the installation.

HOPEWELL, N. J.—The Borough Council is negotiating with the Public Service Electric Company for improvements in the local lighting system.

TRENTON, N. J.—The Bell Telephone Company has made an appropriation of $44,200 for extension of its local aerial cable system. Charles R. Fairchild is district manager.

BRISTOL, PA.—The East Penn Gas & Electric Company is negotiating with the Pennsylvania Railroad for the installation of a power system at its West Morrisville freight yards.

CHESTER, PA.—The City Council has awarded a five-year contract to the Beacon Light Company for lighting the city streets and municipal buildings. The agreement provides for 364 arc lamps and 515 incandescent lights, with increase in power from the present 16 candlepower to 40 candlepower, with following rates of service: Arc lights, $65 per lamp per year; 40-candlepower incandescent lamps, $14.25 a year; 60-candlepower, $17; 80-candlepower, $19, and 100-candlepower, $24.

GILBERTSVILLE, PA.—The Douglass-Hanover Electric Company has been incorporated with a capital of $5,000 by R. S. Smyth, of Philadelphia, and others to furnish electric service in this vicinity.

LOCK HAVEN, PA. — The Castanea Electric Light Company, the Dunn-Stable Electric Light Company and the Woodward Electric Light Company, of Lock Haven, have been incorporated with a capital of $5,000. W. S. Harris is interested in all of the companies.

TOPTON, PA.—The proposition to issue $23,000 in bonds for the erection of a municipal electric-lighting plant was defeated at a recent election.

CUMBERLAND, MD.—It is reported that the Cumberland & Westernport Electric Railway Company has two new power plants under construction.

CHARLOTTE, N. C.—The Southern Public Utilities Company has awarded a contract for raising the bulkheads, deepening the tail race and other improvements at its Portman Shoals hydroelectric plant. The work will cost about $30,000.

CHARLESTON, S. C.—The Charleston & Summerville Interurban Railway Company is securing right of way, preliminary to resuming work on its proposed electric line between Charleston and Summerville. J. L. David is president of the company.

McCORMICK, S. C.—The Isolated Light & Power Company, of Spartanburg, is seeking a franchise to furnish light and power here.

GREENSBORO, GA.—Citizens here are planning ways and means to secure electric service.

NORTH CENTRAL STATES.

LONDON, O.—The Board of Public Affairs has secured the services of C. C. Slater, of Columbus, to draw up plans for remodeling the local electric-lighting plant. Two new generating units probably will be installed.

OXFORD, O.—The City Council has voted $10,000 for the rehabilitation of the local electric-lighting plant.

POMEROY, O.—The Pomeroy Utility Company has been organized with $1,000 capital stock by H. B. Collins and others to furnish electric light and power here.

BLOOMFIELD, IND.—The Public Service Commission has approved the purchase of six public utilities of Southeastern Indiana by the Indiana Power & Water Company, recently organized with headquarters in this city. The selling concerns are the Indiana Light & Power Company, Worthington; the Home Light & Power Company, Bloomfield; the Elnora Light & Power Company, Elnora; the Meyers Light & Power Company, Ogden; the Bicknell Light & Power Company, Bicknell, and the Linn Coal Company, also of Bicknell. The Indiana Power & Water Company is owned by H. L. Clarke, B. M. Simon and associates, of Chicago, and C. E. Gregg and others, of Bloomfield. The company was organized at Bloomfield last July and asked permission to issue $199,000 in capital stock and $945,000 in bonds. The new company proposed to buy the six other companies for an aggregate of $214,000 and to maintain the companies as a unit to supply light, heat, power and water to the towns and vicinities of Lyons, Marco, Linton, Sanburn, Bruceville, Washington, Switz City, Newberry, Westphalia, Freelandsville, Plainville and Wheatland.

BENTON, ILL.—The St. Louis & Southern Illinois Interurban System, with headquarters here, has planned 81 miles of electric line to cost about $3,000,000, this figure including power plant equipment. Material for the new line has not yet been purchased.

LANARK, ILL.—The Peoples Gas & Electric Light Company has submitted a proposition to the City Council for furnishing electric service here. The company plans to take over the local electric-lighting plant and give 24-hour service as soon as a transmission line can be built to this city.

OTTAWA, ILL.—The Chicago, Ottawa & Peoria Railway Company is rebuilding its transmission line connecting Spring Valley and the power plant of the Northern Illinois Light & Traction Company.

WAUKEGAN, ILL.—A certificate of convenience and necessity has been granted by the Illinois Public Utilities Commission to the Chicago, Fox Lake & Northern Electric Railway Company for the construction of an electric railroad from Evanston to Palatine. According to L. K. Sherman, of Chicago, chief engineer of the road, ground will be broken early next year.

LADYSMITH, WIS.—Negotiations are being completed for the purchase of the holdings of the Ladysmith Lighting Company by the Ashland Light & Power Company. The latter company is making a 12,000-horsepower hydroelectric development at Big Falls and a transmission line will be built from there to this city.

ST. CLAIR, MINN.—The Northern States Power Company has been awarded a contract for furnishing energy for street lighting and water pumping. Construction work has been started on a transmission line to serve this community.

SOUTH ST. PAUL, MINN.—The Northern States Power Company has secured a contract covering the electric power requirements for water pumping.

BURT, IOWA.—December 9 the question of issuing $13,000 in bonds to purchase an electric-lighting system will be submitted to vote.

CEDAR RAPIDS, IOWA. — The Iowa Railway & Light Company is planning the installation of a 100-kilowatt generating unit in its Guthrie Center power plant.

ELKADER, IOWA.—Schmidt Brothers & Company, owners of the Elkader electric light and power plant, are making improvements in their properties here.

IOWA FALLS, IOWA.—The Iowa Electric Company and the Iowa Falls Electric Company, of which John Read, of Cedar Rapids, is the attorney and vice-president, were granted franchises for a number of new high-tension transmission lines by the State Railroad Commission. The Iowa Electric Company secured franchises for lines from Oneida to Greely, Anamosa to Maquoketa, Oneida to Worthington, and Herndon to Guthrie Center, Menlo, Casey and Adair. The Iowa Falls Electric Company was granted a franchise for a line from Garner to Belmond.

PRAIRIEBURG, IOWA.—A franchise has been granted to the Electric Service Company, of Central City, to extend its lines to this place for furnishing electrical energy for light, heat and power.

ROCKWELL CITY, IOWA.—Improvements are being made to the Iowa Light, Heat & Power Company's distribution lines in Lake City, Lohrville City and this city. E. L. Utter is local manager of the company.

JOPLIN, MO. — The Empire District Electric Company, of which B. C. Adams is general manager, plans improvements to its Spring River plant costing about $25,000.

LEES SUMMIT, MO.—L. K. Green & Company, which operates electric-lighting plants in Pleasant Hill and this city, plans the erection of a transmission line to connect the two cities. The company is also making plans for improvements to the generating equipment in the plant at Pleasant Hill.

ODELL, NEB.—The local electric lighting-plant was destroyed by fire last week. The plant, which was owned by James Berry and valued at $4,000, will be rebuilt at once.

LESTERVILLE, S. D.—The question of issuing $18,000 in bonds for the erection of an electric-lighting plant will be submitted to a vote.

SOUTH CENTRAL STATES.

HODGENVILLE, KY.—The Hodgenville Lighting Company has purchased a 2,400-volt generator to be installed next spring. This will supply alternating current at 110 volts and will replace the present 220-volt service.

MANCHESTER, TENN. — The City Council has appointed a committee to negotiate with the Public Service & Power Company for securing improvements to the local street-lighting system.

MONTGOMERY, ALA.—Following the construction of a bridge over the Tallapoosa River, for which bonds have been voted, the Montgomery Light & Traction Company will extend its Pickett Springs line to Wetunpka, Ala., about eight miles, at a cost of about $125,000.

COLUMBUS, MISS.—The City Council has approved a movement for the installation of a white-way system.

ENGLAND, ARK.—The England Public Service Company has been incorporated with a capital of $100,000, the incorporators being M. D. Goldsby, R. L. Buffalo and C. L. Emerson. The company proposes to manufacture electricity for light and power.

KENNER, LA.—Xavier A. Kramer, consulting engineer, of Magnolia, Miss., has prepared plans for an electric-lighting plant and water-works system in this city.

AFTON, OKLA.—R. E. Ovetton, of Vinita, representing the Public Service Corporation of Oklahoma, has submitted a proposition to the Board of Trustees for the purchase of the local electric-lighting plant for $12,000. The transfer probably will be made and the plant improved.

ARDMORE, OKLA.—Returns from the city election show that an ordinance extending the franchise of the electric-lighting company and establishing a white-way system on principal streets carried.

VERDEN, OKLA.—The Chickasha Gas & Electric Company has completed the installation of a transmission line to this city and is now furnishing electric service here.

D'HANIS, TEX.—The construction of an electric-lighting plant is contemplated here.

FORT WORTH, TEX.—The Fort Worth-Western Right-of-Way Company has been organized for the purpose of promoting the construction of a railway, either electric or steam, between Fort Worth and a connection with the Gulf, Texas & Western Railroad, a distance of about 60 miles.

HOUSTON, TEX.—It is reported that the Houston Lighting & Power Company, of which E. B. Parker is president, plans to enlarge its electric light and power plant. A party of Eastern bankers who are interested in the securities of the company recently visited Houston and made an inspection of the properties. The Houston Lighting & Power Company is a subsidiary of the American Cities Company of New York.

SAN ANTONIO, TEX.—The City Commission plans to employ an expert engineer to make a survey of the properties of the San Antonio Gas & Electric Company.

SAN ANTONIO, TEX.—A large amount of electrical equipment will be required for the Gotham City suburb which the Gotham Film Corporation of New York is to build here. The general contract for the construction of the city has been let to J. P. McDonald, of Austin, for $350,000.

DATES AHEAD.

American Physical Society, University of Chicago, Chicago, Ill., December 2, Secretary, A. D. Cole, Columbus, O.

United States Independent Telephone Association. Annual convention, Hotel La Salle, Chicago, Ill., December 5-8. Secretary, W. S. Vivian, 19 South La Salle Street, Chicago, Ill.

American Society of Mechanical Engineers. Annual meeting, New York City, December 5-8. Secretary, Calvin W. Rice, 29 West Thirty-ninth Street, New York City.

Kansas Public Service Association. Annual meeting, Topeka, Kans., December 7-8. Secretary, E. A. Wright, Manhattan, Kans.

American Institute of Electrical Engineers. Monthly meeting, Boston, Mass., December 8. Secretary, F. L. Hutchinson, 29 West Thirty-ninth Street, New York, N. Y.

American Association for the Advancement of Science. Annual meeting, New York City, December 26-30. Permanent secretary, L. O. Howard, Smithsonian Institution, Washington, D. C.

American Institute of Chemical Engineers. Annual convention, New York City, January 10-13, 1917. Secretary, J. C. Olson, Cooper Union, New York, N. Y.

New Mexico Electrical Association. Annual convention, Albuquerque, N. M., February 12-14. Secretary pro tem., E. A. Thiele, Roswell, N. M.

WESTERN STATES.

ALBERTON, MONT.—The Chicago, Milwaukee & St. Paul Railway has added 110 miles to its electrically operated lines in Montana. This is the third unit to be changed from steam to electric operation and extends from Deer Lodge to Alberton. Construction work on the fourth and last unit, from Alberton to Avery, Idaho, will be completed about the first of the year, at which time the railroad will have 440 miles of electric line in operation.

DENVER, COLO.—The construction of a new street-lighting system in Champa Street from Fourteenth to Twentieth Streets has been commenced. The cost of the work will be about $10,000.

CHLORIDE, ARIZ.—The Arizona Corporation Commission has refused the application of the Wallapai Light & Power Company for a certificate of convenience and necessity to operate an electric-lighting system in this city.

SALT LAKE CITY, UTAH.—Engineers of the Denver & Rio Grande Railway have completed surveys and estimates for the Soldier Summit grades, and plans will be submitted to H. U. Mudge, president of the railroad, who will make recommendations to the board of directors concerning the change from steam to electrical operation from the grades over the Wasatch Mountains. The building of a high-tension line by the Utah Power & Light Company from Provo to Price is said to be the first step in the proposed electrification. It is understood that the cost of power is now being estimated by the Utah company and that contracts may be tentatively entered into within the next few weeks.

SALT LAKE CITY, UTAH.—Extensive development of the Utah Power & Light Company, which already have taken place, and plans for future general development have resulted in the increase of the capitalization of the company from $45,000,000 to $60,000,000, which was recently announced. It is reported that development will consist chiefly in extensions in furnishing power to railroads and electric furnaces of iron smelters. The electrification of the Saltair line next summer will call for a big power contract and the electrification of the Bingham & Garfield Railroad and general operation of the Utah Copper mine by electricity is under consideration. An electric furnace has been installed in the plant of the Utah Iron & Steel Company in Midvale and it is reported that contracts have been let for the erection of a number of other large electric smelting furnaces. These will call for a great amount of energy.

PRESTON, IDAHO.—C. G. Haynes, of Blackfoot, states that the project of the Pocatello Traction & Interurban Company to construct an electric road north from here to the Yellowstone is assured.

SAND POINT, IDAHO.—Work is about to commence on the construction of 16 miles of government telephone line to connec Moylo and Leonia.

ANACORTES, WASH.—The City Council recently passed a resolution inviting the Puget Sound Traction, Light & Power Company to extend its transmission lines to the city and furnish service here.

EVERETT, WASH. — The Washington Utilities Company has been granted a franchise for the construction of power transmission and distributing lines from Norman to Florence and Stanwood.

EVERETT, WASH.—D. R. Keys and C. A. Riddle have acquired a site on Glacier Creek and plan the installation of a hydroelectric power plant, with transmission system to the Monte Cristo mining district.

HOQUIAM, WASH.—The project to vote bonds in the sum of $175,000 for the purpose of acquiring the distributing system of the Grays Harbor Railway & Light Company in Hoquiam or the construction of a new plant for the city was defeated.

SEATTLE, WASH.—The City Council and the Seattle & Rainier Valley Railroad Company have reached an understanding whereby the company will, upon being relieved of certain franchise obligations, spend $10,000 in improvements.

SEATTLE, WASH. — An ordinance has been introduced in the Council which provides for the condemnation of land and other property for a steam electric power plant site, near the present power plant at Lake Union. The additional unit will have a capacity of 7,500 kilowatts, the cost being estimated at $350,000.

SPOKANE, WASH. — The Washington Water Power Company has made application for a franchise for the construction of a new transmission line on certain roads in Lincoln County.

EASTSIDE, ORE.—The Oregon Power Company has been granted a 25-year franchise for the installation and operation of a local light and power system, with provision that construction must commence within 60 days.

EUREKA, CAL.—H. L. Jackman, manager of the Western States Gas & Electric Company, has announced plans whereby that company will connect with the power lines of the Northern California Power Company.

EUREKA, CAL.—Government engineers who are now looking for water power for the generation of electricity in the manufacture from the atmosphere of nitrates for fertilizers will be asked to make investigations in Humboldt County on the Klamath River.

FRESNO, CAL.—The Lewis Electric Company has been awarded the contract for the installation of an electrolier lighting system on I Street on its bid of $9,575. Similar construction is being considered for J Street.

HILLSBOROUGH, CAL.—The Pacific Telephone & Telegraph Company has been granted permission to erect a building at the intersection of Floribunda Avenue and the state highway.

LONG BEACH, CAL.—J. L. Adams, local manager of the Pacific Telephone & Telegraph Company, has received word that $10,000 has been appropriated for immediate use in laying additional underground cables here. The company has further appropriated $15,000 for the extension of cables to Seal Beach, it is stated.

LOS ANGELES, CAL.—The Sespe Light & Power Company, Security Building, is planning the construction of a hydroelectric power plant on the Ventura River, to be used in connection with irrigation work. Ralph Bennett, Central Building, is the engineer.

LOS ANGELES, CAL.—Bids will be received up to November 28 by the Public Service Commissioners for 33,000-volt transformers in accordance with specifications on file with the board.

LOS ANGELES, CAL.—A petition received by the City Council asking for the ornamental lighting of Beacon Street from Fourth to Sixth Streets, has been referred

to the City Engineer for a report as to frontage.

MERCED, CAL.—The City Trustees have selected a design for the electroliers to be installed in the business section, and the City Engineer has been instructed to prepare plans and specifications for the system.

OAKDALE, CAL.—Announcement of the plans of the Sierra & San Francisco Power Company for the construction of new reservoirs on the Stanislaus River will probably result in the reopening of negotiations with the Oakdale Irrigation District for the use of the stored water, after it has once been used for developing power. The Oakdale and South San Joaquin Districts have always claimed title to the waters of the Stanislaus in excess of that now stored by the power company. While denying this claim, the power company claims jurisdiction over the stored water, and is able to control the flow of the river. It is likely that an amicable agreement will eventually be reached.

SAN BERNARDINO, CAL.—J. G. Van Sandt, Forest Home, is planning the installation of a hydroelectric power plant in the vicinity of Mill Creek, with power transmission system for the San Gormgonio project. Application for permission has bene made to the State Water Commission.

SAN FRANCISCO, CAL.—The Sierra & San Francisco Power Company has applied to the Railroad Commission for authority to do business in San Benito County under a franchise which it hopes to obtain from the supervisors of that county, to sell and distribute electricity for light, heat and power purposes.

SAN FRANCISCO, CAL.—The Pacific Gas & Electric Company has applied to the Railroad Commission for authority to use $2,500,000 of the proceeds of its first preferred stock issue and its general and first refunding bonds. Of this amount about $1,850,000 will be used for development of its plants at South Yuba and Spalding Rivers. The company reported that up to September 1 it had sold of the foregoing authorized securities all of the bonds and 9,939 shares of stock at an average price of $91.62 per share, amounting to $910,697.

SAN PEDRO, CAL.—The lowest bid received by the Board of Harbor Commissioners for electric installations for Shed 152 was submitted by the J. M. Mullins Company at $2,315.

TULARE, CAL.—The Board of Trustees received several bids for the construction of the new electrolier system in the business section of the city and will award the contract shortly.

VISALIA, CAL.—The Mount Whitney Power & Light Company will install an ornamental street-lighting system on Main Street.

WEAVERVILLE, CAL.—The Northern California Power Company is constructing a transmission line from Lewiston to this city, a distance of eight miles.

HONOLULU, T. H.—The contract for the installation of new electrical equipment for the Hilo Electric Light Company has been awarded to the Hawaiian Electrical Company on its bid of $18,500.

CANADA.

MEGANTIC, QUE.—The local electric-lighting plant was entirely destroyed by fire recently.

WEEDON, QUE.—The Two Mills Falls Power Company, of this city, has been awarded a contract for the construction of a high-tension transmission line from Weedon to Sherbrooke, about 30 miles.

SAULT STE. MARIE, ONT.—The City Council is planning the installation of motor-driven pumping equipment.

PENTICTON, B. C.—Council has authorized the purchase of the twelve 5-ampere wattmeters and two 10-ampere wattmeters. The question of purchasing a Diesel engine to cost about $25,000 is also being considered.

Proposal

TELEPHONE AND POWER LINE CONSTRUCTION.—Sealed proposals will be received at the Bureau of Yards and Docks, Navy Department, Washington, D. C., until December 18 for a telephone cable connection between the Pacific Coast Torpedo Station, Keyport, Wash., and the Puget Sound Navy Yard; also an electric power transmission line from the Olympic Power Company's pole line to the radio building at the above-named torpedo station. Plans and specifications may be obtained on application to the Bureau of Yards and Docks or to the commandant of the navy yard named.

New Incorporations

MIDDLETON, O.—Middleton Gas & Electric Company has reduced its capital stock from $700,000 to $1,000.

FRANKLIN, O.—Franklin Electric Light Company has reduced its capital stock from $15,000 to $1,000.

NEW YORK, N. Y.—Standard Light, Heat & Power Company has increased its capital stock from $60,000 to $150,000.

WILMINGTON, DEL. — Consolidated Wire Company. Capital, $150,000. Incorporators: G. E. Fooks, K. M. Dougherty and L. S. Dorsey.

MANSFIELD, O. — Mansfield Electric Hardware Manufacturing Company. Capital, $20,000. Incorporators: P. T. Curley, E. J. Gilbert and others.

NEW YORK, N. Y.—Columbia Electric Novelty Company. Capital, $5,000. Incorporators: M. Eibetz, S. Liber and E. I. Heins, 71 Mercer Street.

WYNDMERE, N. D. — Wind Electric Company. Capital, $300,000. Manufacture electrical specialties. Incorporators: George and Wallace Manikowske and C. D. Clippell.

INDIANAPOLIS, IND.—American Appliance Company. Capital, $40,000. Manufacture electric appliances. Incorporators: Arthur Taylor, R. T. MacFall and H. D. Haring.

BOSTON, MASS.—Manhattan Electrical Supply Company. Capital, $5,000,000. Incorporators: James J. Ryan, John M. Lyon, Charles S. Bulkley and Norman J. MacGaffin.

ATLANTIC CITY, N. J.—Motor Steam Generator Company. Manufacture devices for internal combustion engines. Incorporators: Charles W. Evans and Robert J. Eccles.

NEWTON, N. J.—Newton Electric & Gas Company. Capital, $125,000. Furnish electric energy and gas to Newton and vicinity. Incorporators: F. W. Hills, A. H. Atterbury and Morgan Colt.

NEW YORK, N. Y.—F. E. Oettinger Corporation. Capital, $5,000. Manufacture electrical appliances. Incorporators: F. W. Oettinger, 54 Vanderbilt Avenue; F. W. Baer and A. K. Hornstein.

KANSAS CITY, MO.—Electrograph Company of Kansas City. Capital, $1,000,000. Handle electric advertising and electrical supplies. Incorporators: J. F. Rudd, A. L. Landsberg and M. T. Miller.

DOVER, DEL.—Ohio Utilities Company. Capital, $5,000,000. Incorporators: E. Hawley Van Wyck, Cranford, N. J.; A. A. Bridgham, Hillsdale, N. J., and L. M. Symmes, Mount Vernon, N. Y.

DOVER, N. J.—Stoneware Electric Stove Company. Capital, $50,000. Manufacture electric stoves and electric heating devices. Incorporators: Arthur O. Christensen, John L. Sullivan, Dover, and William Taylor, Plainfield, N. J.

SARATOGA SPRINGS, N. Y.—W. J. Case & Son. Capital stock, $10,000. Electrical and general construction, handle supplies. Incorporators: D. A. Case and J. T. Maher, Saratoga Springs, and W. D. Mauson, Schenectady.

NEW YORK, N. Y.—I. P. Frink, Incorporated. Capital, $30,000. Manufacture reflectors, lighting fixtures, etc. Incorporators: G. F. Spencer, Montclair, N. J.; W. H. Spencer, 468 West Twenty-fourth Street, New York City, and F. T. Ward, East Orange, N. J.

Financial Notes

Rudolph Hecht and George de B. Keim have been elected directors of the Manhattan Electrical Supply Company.

Directors of the Narragansett Electric Lighting Company have voted to increase its capital stock by the issue of 20,000 shares of a par value of $50, dated January 2, 1917. The present capitalization is $7,500,000. Besides the $1,000,000 addition, the company has public authorization of an issue of $500,000 either in shares or debentures.

Massillon Electric & Gas Company, a subsidiary of Cities Service Company, has completed arrangements for refunding its present $500,000 first-mortgage bonds maturing in 1948 by the creation of a new first mortgage of $2,000,000 authorized amount, maturing in 1956. The old mortgage was a closed issue, and the demand for service on the company necessitated additional bond financing. The Ohio Public Utilities Commission has authorized the company to issue $540,000 bonds under the new mortgage to refund the present outstanding bonds, and also to issue and sell $125,000 six-per-cent preferred stock.

The first-mortgage five-per-cent sinking-fund gold bonds of the Laurentide Power Company, Ltd., are being offered at a price to yield over 5.60 per cent by a syndicate composed of Chase & Company and Stone & Webster of Boston. The bonds are a closed mortgage, are dated January 1, 1916, and are due January 1, 1946. There is a sinking fund which provides for the redemption of approximately half of the entire issue before maturity. The bankers state that the net income issued from long-term contracts assures nearly twice the interest on the entire bond issue, without considering the revenue to be derived from the sale of approximately 50,000 additional horsepower.

The Santa Barbara (Cal.) Telephone Company, the Home Telephone & Telegraph Company of Santa Barbara, the Pacific Telephone & Telegraph Company and the Sunset Telephone & Telegraph Company have filed a supplemental application for authority for the issuance by the Santa Barbara Telephone Company to the Home company $74,000 of its preferred stock and $80,000 of its common stock; for the issuance by the Santa Barbara company to the Pacific company of $276,000 of its preferred capital stock, and for permission to apply $90,000 from the sale of bonds and $50,000 from stock in part payment for property and satisfaction of bonds and for working capital.

The Philadelphia Electric Company at a directors' meeting November 15 ordered an assessment of $2.50 a share, payable December 16, in connection with its refinancing plans and proposed extensions. At the same time the usual quarterly dividend of 1.75 per cent, payable December 15, was declared, allowing stockholders to use this fund towards the payment of the assessment. The assessment call is estimated to net about $2,500,000, and will be used as a part of the fund necessary for payment of $3,500,000 notes due in 1917, and for proposed extensions in the company's plants and system. The new generating station to be erected at Chester is estimated to cost $6,000,000, and other stations are now being planned, which will involve considerable expenditure.

Gross income of Cities Service Company for October was $1,122,910, the greatest in the company's history for a like period and larger by $400,855 than the figures for September, and $711,405, or 173 per cent in excess of the earnings for October, 1915. After providing for all expenses, taxes, interest and preferred dividends, the balance

CLOSING BID PRICES FOR ELECTRICAL SECURITIES ON THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

	Nov. 20	Nov. 13
American Telephone & Telegraph (New York)	132¼	123
Commonwealth Edison (Chicago)	142	145
Edison Electric Illuminating (Boston)	232	223
Electric Storage Battery common (Philadelphia)	70½	70½
Electric Storage Battery preferred (Philadelphia)	70½	70½
General Electric (New York)	182	179⅝
Kings County Electric (New York)	130	129
Massachusetts Electric common (Boston)	4¾	4
Massachusetts Electric preferred (Boston)	30	30
National Carbon common (Chicago)	300	301
National Carbon preferred (Chicago)	—	—
New England Telephone (Boston)	128	123
Philadelphia Electric (Philadelphia)	29⅞	29⅝
Postal Telegraph-Cables common (New York)	85	85⅛
Postal Telegraph-Cables preferred (New York)	65½	65½
Western Union (New York)	101½	101⅛
Westinghouse common (New York)	65¼	64⅛
Westinghouse preferred (New York)	72	72

of $829,298 applicable to dividends on the common stock for the month was more than $100,000 larger than the gross income of the company for September, 1916. For the 12 months ended October 31, the gross earnings were $8,233,953, an increase of $4,001,038, or 94 per cent compared with the preceding period, while the balance for the common stock was $5,542,151, a gain of $3,538,735, or 176 per cent over the preceding 12 months, and equivalent to 30.25 per cent on the average amount of common stock outstanding during the period, as compared to 13.61 per cent for the previous year. For the 12 months the preferred dividend requirements were earned 3.61 times, compared with 2.27 times for 12 months ended October 31, 1915.

While the revenues of the holding company for the month reflected to a greater extent than heretofore the operations of the oil properties, nevertheless the strictly utility companies also contributed substantially to the large gains made.

Dividends.

	Term	Rate	Payable
Am. Rys.	—	$1	Dec. 15
Blackstone Val. Gas & Elec., pf.	S	$3	Dec. 1
Blackstone Val. Gas & Elec., com.	Q	$2	Dec. 1
Cent. Miss. V. Elec., pf.	Q	1.5 %	Dec. 1
Cities Service, com.	M	0.5 %	Jan. 1
Cities Service, pf.	M	0.5 %	Jan. 1
Conn. Pw., pf.	Q	$1.50	Dec. 1
Cumb. Pw. & Lt.	A	$5	Dec. 18
Gen. Elec.	Q	2 %	Jan. 15
Norf. Ry. & Lt.	S	3 %	Dec. 1
Nor. Texas Elec.	Q	$1	Dec. 1
Pensacola Elec., pf.	S	$3	Dec. 1
Pensacola Elec., Extra	—	$1.50	Dec. 1
Phila. Elec.	Q	1.75%	Dec. 15
S. W. Pw. & Lt., pf.	Q	1.75%	Dec. 1
United Lt. & Rys., first pf.	Q	1.5 %	Jan. 2
United Lt. & Rys., com.	Q	1 %	Jan. 2

Reports of Earnings.

NIAGARA, LOCKPORT & ONTARIO.
(And Salmon River Power)

	1916	1915
September gross, less purchased power	$ 101,343	$ 74,329
Net	66,056	50,922
Total income	69,770	51,890
Balance after taxes and rentals	56,244	45,942
Nine months' gross, less purchased power	946,889	688,632
Net	699,102	500,515
Total income	726,257	515,545
Balance after taxes and rentals	599,605	462,555

Interest on first-mortgage bonds of both companies for nine months including bonds about to be issued for construction of new steam generating station was $349,969, which included $18,525 on bonds held in the sinking fund.

DETROIT EDISON COMPANY.

	1916	1915
October gross	$ 905,105	$ 686,320
Net after taxes	333,536	261,899
Surplus after charges	245,420	162,928
Ten months' gross	7,961,265	6,113,847
Net after taxes	2,914,571	2,219,197
Surplus after charges	2,019,548	1,319,593

NORTHERN STATES POWER.

Northern States Power reports earnings for September and twelve months as follows:

	1916	1915
September gross	$ 485,175	$ 407,179
Net after taxes	255,767	223,107
Twelve months' gross	5,822,703	4,903,338
Net after taxes	3,233,956	2,714,075
Surplus after charges	1,633,420	.....
Balance after preferred dividend	959,112	.....

REPUBLIC RAILWAY & LIGHT.

	1916	1915
October gross	$ 338,613	$ 276,356
Net after taxes	149,691	109,944
Total income	150,787	110,050
Surplus after charges	78,292	52,773
Balance after preferred dividends	52,147	26,815
Ten months' gross	3,269,262	2,511,277
Net after taxes	1,373,199	972,351
Total income	1,378,779	973,641
Surplus after charges	678,101	412,672
Balance after preferred dividends	417,645	153,102

VIRGINIA RAILWAY & POWER.

	1916	1915
October gross	$ 502,262	$ 473,073
Net	250,424	254,711
Total income	259,482	264,013
Surplus after tax, charges, sinking fund and depreciation	103,083	112,376
Four months' gross	1,969,597	1,816,634
Net	998,515	946,247
Total income	1,034,254	980,918
Tax, interest and sinking fund	591,483	572,979
Depreciation	33,333	33,333
Surplus	409,437	374,606

UTAH SECURITIES.

Consolidated earnings of subsidiaries of Utah Securities Company for October and the twelve months ended October 31, show:

	1916	1915
October gross	$ 510,247	$ 432,601
Net after taxes	295,682	237,687
Twelve months gross	5,450,233	4,703,796
Net after taxes	3,014,518	2,427,445

NEW YORK STATE RAILWAYS.

	1916	1915
October gross	$ 692,841	$ 631,802
Net after taxes	228,061	219,519
Surplus after charges	112,917	105,704
Ten months gross	6,910,119	6,066,317
Net after taxes	2,231,609	1,977,635
Surplus after charges	1,087,527	818,165

Foreign Trade Opportunities

[Addresses may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D.C., or its offices at Boston, New York, Seattle and San Francisco. Write on separate sheet for each item and give file number.]

NO. 23,016. ELECTRICAL SUPPLIES.—An import firm in West Africa desires to enter into commercial relations with American manufacturers of electric fixtures, fans, etc. Correspondence should be in French.

NO. 23,017. DYNAMOS AND SPECIALTIES.—A Scandinavian business man who has been in the United States four years will shortly return to his native country. He desires to communicate with American manufacturers with a view to establishing sales agencies in Norway and Sweden for electric dynamos and specialties. References.

New Publications

ELECTRICAL DATA.—The Underwriters' Laboratories, Chicago, Ill., has issued a pamphlet announcing label service for cartridge inclosed fuses and snap switches, and discussing the use of fuses, bushings for conduit-box covers, fires and accidents due to electricity, rats and lead-covered cable.

RAILWAY PROBLEMS.—Bulletin No. 90 of the Engineering Experiment Station, University of Illinois, is entitled "Some Graphical Solutions of Electric Railway Problems," by A. M. Buck. Problems dealing with motor performance and control, speed-time and distance-time curves, and the heating value of a variable current are worked out by means of diagrams. Copies can be obtained by application to the Director, Urbana, Ill.

EXPORTING TO AUSTRALIA.—A publication, very apropos in view of the more or less disturbed conditions obtaining in trade with Australia at the present time, is Commercial Attache Philip B. Kennedy's "Exporting to Australia." In this work Mr. Kennedy discusses the practices and regulations to be observed by American shippers with reference to packing, insurance, documentation, postage, parcel post and express, correspondence, traveling representatives and taxation affecting foreign merchandise. In an appendix forms are included of the statutory declaration by the exporter, requisition for document credit, letter of credit and also the Trade Descriptions Act of 1905 with the regulations thereunder. Copies of this publication may be obtained from the United States Bureau of Foreign and Domestic Commerce.

Electrical Patents Issued November 14, 1916

Prepared by Thomas Howe, Patent Attorney, 2 Rector Street, New York, N. Y.

1,204,395. **Alternating-Current Rectifier.** D. M. Bliss, assignor to T. A. Edison, West Orange, N. J. Arrangement of switches and brushes.

1,204,398. **Electrodeposition of Metal on Rotation Bodies.** H. W. Bots, Lugwigshafen-on-the-Rhine, Germany. For depositing metal on surface of wheel fellies.

1,204,399. **Lock-Out System for Party-Line Telephones.** J. W. Bowley, Simpson, Saskatchewan, Canada. Detailed arrangement of circuits.

1,204,407. **Protective Means for Transmission Lines.** G. J. D. Centerwall, Stockholm, Sweden. Excessive energy resulting from abnormally high-voltage disturbances is dissipated by formation of corona.

1,204,411. **Vapor Rectifier.** F. Conrad and K. A. Simmon, assignors to Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa. Comprises two three-anode rectifier units with variable connections for different voltages and loads.

1,204,412. **Cable Terminal.** F. B. Cook, assignor to F. B. Cook Co., Chicago, Ill. Arrangement of terminals and distributing cup.

1,204,432. **Control System for Electric Motors.** A. J. Hall and L. G. Ruley, assignors to Westinghouse Electric & Mfg. Co. Series-parallel control of direct-current motors.

1,204,435. **Combined Circuit-Breaker and Switch.** F. O. Hartman, Mansfield, O. Details of simplified structure.

1,204,456. **Incandescent Lamp.** A. S. Knight, assignor to Westinghouse Lamp Co., E. Pittsburgh, Pa. Filament support.

1,204,457. **Electric Binding-Post.** A. L. Kreeft, West Orange, N. J. Push-operated device with spring-actuated, non-aligning orifices.

1,204,463. **Electric Railway System.** P. W. Leffler, Chicago, Ill. Power system comprising blocks and sectional third-rail.

1,204,466. **Switch-Actuating Mechanism.** J. L. McQuarrie, assignor to Western Electric Co., New York, N. Y. For telephone exchange.

1,204,469. **Electromagnetic Relay.** V. E. Middlekauff, assignor to W. H. Reisner Mfg. Co., Hagerstown, Md. Details of multiple-contact device.

1,204,481. **Secondary or Storage Battery.** C. W. Norton, assignor to Edison Storage Battery Co., West Orange, N. J. Connections of plate, one set of plates being connected with the container.

1,204,485 and 1,204,486. **Electrical Protective Device.** K. C. Randall, assignor to Westinghouse Electric & Mfg. Co. First patent: relay system; second patent: structural details of electromagnet.

1,204,489. **Measuring Magnetic Properties of Materials and Apparatus Therefor.** W. Rogowski, assignor to Siemens & Halske A. G., Berlin, Germany. For measuring the magnetic tension between two points of a magnetic circuit.

1,204,497. **Automatic Train-Stop.** H. G. Sedgwick, assignor to National Safety Appliance Co., Mill Valley, Calif. Track instrument disrupts train circuit controlling brakes.

1,204,501. **Spike-Driving Machine.** G. B. Shipley, Pittsburgh, Pa. Machine for driving screw spikes in railway cross ties is magnetically held to metal tie-plates.

1,204,507, 1,204,508 and 1,204,510. **Electrical Protective Device.** B. H. Smith and P. MacGahan, assignors to Westinghouse Electric & Mfg. Co. Relay structures.

1,204,509. **Electrical Relay.** B. H. Smith, assignor to Westinghouse Electric & Mfg. Co. Details of device for use with the above.

1,204,513. **Burglar Alarm.** J. W. Smith, Brooklyn, N. Y. Door knob carries circuit-closer and audible alarm.

1,204,539. **Automobile Speed Signal.** A. O Benson, A. A. Benson, G. M. Benson, H. K. Solberg and C. H. Flick, assignors to Benson, Flick & Solberg, Seattle, Wash. Arrangement of colored lamps and signal box.

1,204,540. **Trolley-Wire Hanger.** G. H. Bolus, assignor to Ohio Brass Co., Mansfield, O. Has special form of clamp for gripping two wires.

1,204,573. **Electric Igniter for Explosive Engines.** E. J. Kane, assignor to Webster Electric Co., Racine, Wis. Speed control of engine-driven magneto.

1,204,591. **Signaling Device.** L. I. Randall, Lincoln, Neb. Electromagnetically operated signal.

1,204,599, 1,204,600 and 1,204,601. **Electric System.** F. M. Slough, assignor to Gar-

ford Mfg. Co., Elyria, O. Storage-battery systems with automatic regulation of connections of accumulator on charges and discharges.

1,204,606. Steering-Column Switch. J. C. Stearns, Worcester, Mass. For mounting on automobile steering post, for controlling lights.

1,204,625. Bushing for Electric Tubular Insulation. C. M. Wheelock, assignor to New Process Specialty Co., Milwaukee, Wis. Self-sustaining device.

1,204,628. Lightning Arrester. W. M. Wilson and W. R. McCracken, Bryson City, N. C. For telephone circuits.

1,204,637. Means for Promoting Vegetation. W. J. Anson, San Gabriel, Cal., assignor of one-half to G. B. Nichols, Los Angeles, Cal. Arrangement of conduits with electric conductors and magnetic plates in soil.

1,204,653. Incandescent Lamp. J. H. Dale, assignor to Dale Lighting Fixture Co., New York, N. Y. Special bulb structure.

1,204,675. Rheostat. W. T. Lyon, assignor to International Dental Appliance Co., Portland, Ore. Controller for dental motors.

1,204,717. Train-Control System. G. P. Thurber, Pittsburgh, Pa. Speed-controlled stop.

1,204,720. Circuit Arrangement for Wireless Transmitters. E. Von Lepel, Berlin-Wilmersdorf, Germany. Arrangement of main oscillation circuit of high frequencies.

1,204,721. Apparatus for Sterilizing Liquids by Means of Ultra-Violet Rays. M. Von Recklinghausen, assignor to R. U. V. Co. Comprises mercury vapor lamp and special liquid conduit.

1,204,730. Automatic Spark Control for Internal-Combustion Engines. F. Baier, Anderson, Ind. Arrangement for control by centrifugal governor.

1,204,731. Control Winding for Electric Heating Devices. T. F. Bailey and F. T. Cope, Alliance, O. Special arrangement for thermally controlling electric heaters for a chamber.

1,204,740. Current-Converting Device. A. R. Bullock, assignor to H. C. Lee, Los Angeles, Cal. Condenser arrangement arranged in conjunction with a commutator device.

1,204,742. Telephone System. L. C. Bygrave, assignor to Relay Automatic Telephone Co., London, England. Arrangement of cut-off and calling relays, etc., in an automatic system.

1,204,745. Pressure-Die for Insulator-Pressing Molds. J. P. Dahl-Jensen, Copenhagen, Denmark. Structural details.

1,204,748. Wave Meter. B. V. Deitz, Slingerlands, N. Y. Arrangement of circuits and indicator for measuring alternating-current waves.

1,204,749. Electrical Coil and Method of Winding Same. E. A. DeWolf, assignor to Universal Winding Co., Boston, Mass. Special arrangement of winding layers.

1,204,752. Coin-Separating Device. J. Eldridge, Oakland, and C. Michelsen, Piedmont, Cal. Thermoelectrically generated current is employed to separate coins from other discs.

1,204,759. Time-Valve and Circuit-Breaker. G. B. Gray, assignor to Automatic Train Control & Signal Co., Pittsburgh, Pa. Circuits are controlled by a Bourdon tube.

1,204,765. Hand Microtelephone. W. W. Henry, assignor to S. H. Couch Co., Atlantic, Mass. Structural details. (See cut.)

1,204,766. Selective Signaling Device. W. W. Henry and A. E. Stevens, assignors to S. H. Couch Co. Telephone system.

1,204,783. Telephone-Exchange System. L. D. Kellogg, assignor to Kellogg Switchboard & Supply Co., Chicago, Ill. Special arrangement of link circuits and selective switches.

1,204,814. Self-Starter for Automobiles. P. Okey, Columbus, O. Arrangement of motor-driven flywheel and gearing.

1,204,817. Polyphase Reactance Coil. J. F. Peters, assignor to Westinghouse Electric & Mfg. Co. Arrangement of mutually inductive reactance coils for connecting in the polyphase systems.

1,204,823. Combined Search and Finder-Light for Automobiles. H. A. Rueter, Jamaica Plain, Mass. A searchlight structure has a removable finder-light.

1,204,825. Double-Service Electric Generator and Supply System. J. Sachs, assignor to Hart & Hegeman Mfg. Co., Hartford, Conn. A generator has two sets of windings subjected to different inductive effects, for supplying high and low-tension circuits.

1,204,826. Submarine Signaling Apparatus. J. Schiessler, Baden, Austria-Hungary. Details of a receiver comprising resonator and a microphone.

1,204,835. Relay. A. A. Ziegler, Boston, Mass. Details of special structure.

1,204,857. Apparatus for Controlling the Voltage in Variable-Speed Illuminating Dynamos. E. Fuchs, assignor to L. Renault, Billancourt, France. Structural details of electromagnet.

1,204,884. Semi-Automatic Telephone Exchange System. A. Kneisel, assignor to J. R. Garfield, Cleveland, O. Particular arrangement of circuits and operator's keyboards.

1,204,888. Headlight Shutter. W. L. Large, New York, N. Y. Electromagnetically operated.

1,204,906. Method and Means for Recovering Certain Constituents from Gaseous

No. 1,204,765.—Hand Microtelephone.

Bodies. W. A. Schmidt and L. Bradley, assignors to Research Corporation, New York, N. Y. Separating substances of different condensibility from gases by electrical precipitating actions.

1,204,907. Means for Producing Discharge of Electricity into Gases. W. A. Schmidt, assignor to International Precipitation Co., Los Angeles, Cal. Apparatus for accomplishing the above.

1,204,909. Thermostatic Heat-Regulator. W. E. Souder and R. H. Souder, Tamaqua, Pa. Thermostatically controlled motor controls regulating connection.

1,204,910. Automatic Train-Control System. A. A. Starke, assignor of four-tenths to J. A. Cabot and one-tenth to R. Dikeman, New York, N. Y. Block signal and train stop.

1,204,935. Terminal or Connector for Electrical Conductors. D. Busby, San

No. 1,205,011.—Lamp Guard.

Diego, Cal. Formed of two annular channel-shaped sheet-metal members which overlap each other.

1,204,966. Direction Indicator. J. W. Farrar, Buffalo, N. Y. For automobiles; arrangement of lamps, reflectors and indicating panels.

1,204,986. Internal-Combustion Engine. E. D. Irwin, Johnstown, Pa. Mounting of spark-plug.

1,204,998. Railway Signaling. R. A. McCann, assignor to Union Switch & Signal Co., Swissvale, Pa. Block system for single tracks.

1,205,002. Process of Exhausting Lamps. J. T. Marshall, assignor to General Electric Co., Schenectady, N. Y. Tungsten lamps has substance for improving atmosphere applied to filament, the substance being vaporized by heating of filament after bulb has been exhausted and then sealed off.

1,205,008. Signaling Mechanism for Railway Switches. S. L. Neely, Longton, Kans. Signal-controlling electric switch is related to railway switch operating lever.

1,205,010. Ignition Apparatus. C. E. Pearson, Lansing, Mich. Arrangement of circuits for storage battery and generator.

1,205,011. Lamp Guard. P. D. Phillips and E. G. K. Anderson, assignor to Benjamin Electric Mfg. Co., Chicago, Ill. Cage is attached to rim of shade. (See cut.)

1,205,051. Automobile Lock. L. Souliere, Detroit, Mich. Controls fuel supply, ignition and alarm circuits.

1,205,069. Insulator. R. A. Williams, San Marcos, Tex. Pin type.

1,205,080. Process of Manufacturing Filaments for Incandescent Electric Lamps. F. Baumann, assignor to Wilframlampen Aktiengesellschaft, Augsburg, Germany. Process of manufacturing a ductile rod containing a large percentage of metallic tungsten, alloyed with a small amount of highly refractoring metal such as phorium and the like.

1,205,098. Signal for Automobiles. H. B. McGuire, Fort Wayne, Ind. Direction indicator.

1,205,136. Timer for Internal-Combustion Engines. C. R. Holmes, California, Mich. Structural details.

PATENTS EXPIRED.

The following United States electrical patents expired on November 21, 1916:

637,232. Automatic Fire Extinguisher. J. Butcher, Jersey City, N. J.

637,234. Warp Stop-Motion for Looms. J. Coldwell and C. G. Gildard, Fall River, Mass.

637,235. Electrical Stop-Motion for Looms. J. Coldwell and C. G. Gildard. Fall River, Mass.

637,246. Snap-Switch. M. Guett, Hartford, Conn.

637,282. Electric Insulator. J. A. Poche, New Orleans, La.

637,290. Telegraph Instrument Key. C. J. Scheffler and C. V. Walls, Newcastle, Pa.

637,302. Sparking Igniter for Explosive Engines. G. S. Strong, New York, N. Y.

637,313. Apparatus for Recutting Files by Electrolysis. S. Wicks, Cleveland, O.

637,318. Burglar Alarm for Windows. R. Baumann, St. Louis, Mo.

637,321. Electric Massage Instrument. L. Casper, Chicago, Ill.

637,323. Electrical Switchboard. C. H. Cox, Liverpool, England.

637,337. Railway-Signaling Apparatus. W. Hume, London, England.

637,349. Alternating-Current Electric Motor. C. L. Rosenquist, Birmingham, England.

637,377. Means for Preventing Tampering with Fire-Alarm Boxes. F. Ely, Newark, N. J.

637,409. Electric Protector for Buildings. J. Poche, New Orleans, La.

637,410. Process of and Apparatus for Dissociating Substances by Electrolysis. G. H. Pond, Ashburnham, Mass.

637,414. Electric-Signaling Apparatus for Rail or Tramways. F. W. Prokov, Berlin, Germany.

637,422. Galvanic Battery. C. B. Schoenmehl, Waterbury, Conn.

637,448. Electric Arc Lamp. W. J. Davy and G. T. Davies, London, England.

637,453. Telephone Transmitter. E. F. Frost, United States Army.

637,454. Electric Clock. F. I. Getty, Chicago, Ill.

637,457. Electrical House Wiring. E. T. Greenfield, New York, N. Y.

637,473. Motor-Wattmeter for Three-Phase Alternating Currents. J. A. Mollinger, Nuremberg, Germany.

637,474. Circuit-Breaker. D. L. Moore, Jr., Philadelphia, Pa.

637,569 and 637,571. Controlling Engine for Presses. E. Hett, New York, N. Y.

637,581. Apparatus for Handling Lithographic-Printing Tubes. E. Hett, New York, N. Y.

637,583. Tube-Handling Device. E. Hett, New York, N. Y.

637,584. System for Handling Printing Cylinders. E. Hett, New York, N. Y.

637,585. Electroplating Apparatus. E. Hett.

637,625. Apparatus for Forming Plates for Secondary Batteries. H. Leitner, London, England.

637,635. Mantle for Electric Arc Lamps. P. Merch, Paris, France.

637,678. Explosive Signaling Apparatus for Railways. W. R. Sykes, London, England.

637,705. Telemotor Apparatus. A. E. Brown, Edinburgh, Scotland.

637,711. Driving Mechanism for Dynamos. J. L. Creveling, New York, N. Y.